

SUPPLEMENT.

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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No. 2473.—VOL. LIII.

LONDON, SATURDAY, JANUARY 13, 1883.

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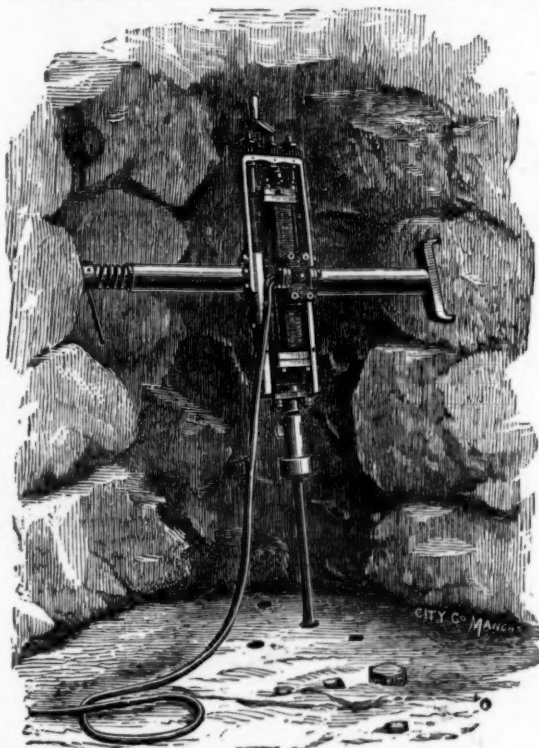


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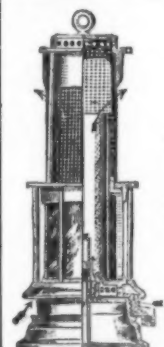
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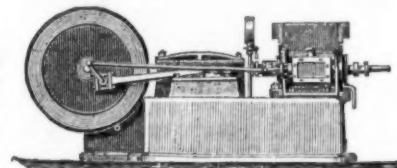
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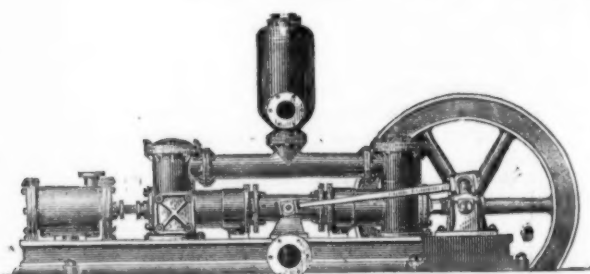
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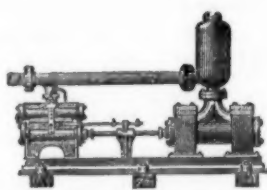
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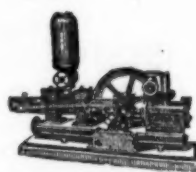
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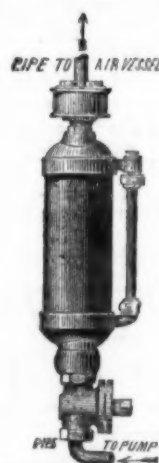
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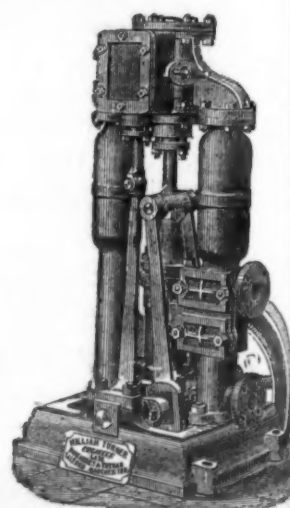
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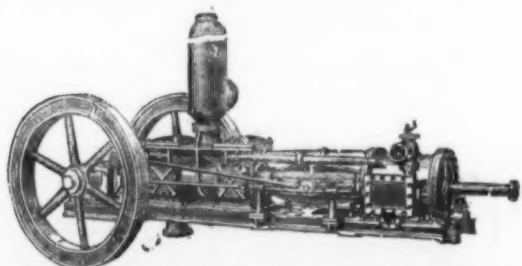
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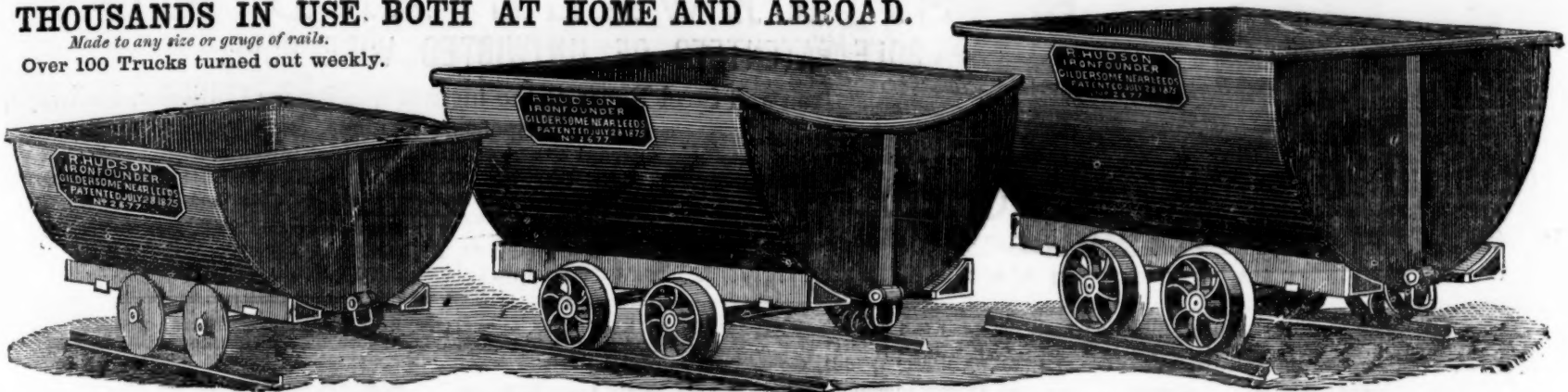
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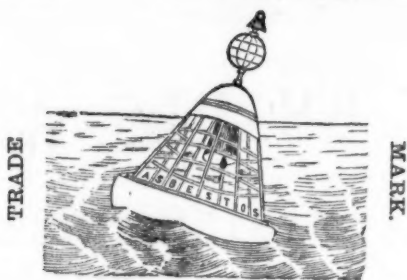
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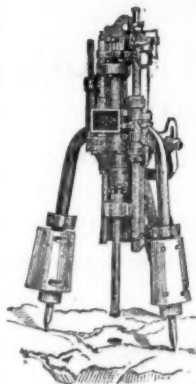
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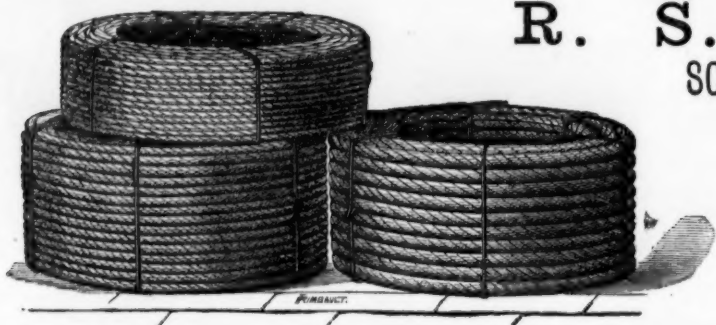
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FOREIGN MINING AND METALLURGY.

There is little, if any, change to report in the general condition of the German iron trade. The demand has been somewhat reduced, but notwithstanding this producers do not appear disposed to consent to lower rates. They have, on the contrary, resolved to maintain quotations, and to diminish production. A resolution to this effect has been adopted already by makers of white pig, who have determined to curtail their output 15 per cent., and who have begun to put their decision into execution. The rolling-mills are fairly well employed, although agents continue to dispose of their stocks at relatively low rates. Prices have not varied during the last few days, and the production of pig, although smaller than that of preceding months, is still nevertheless much in excess of the output of the corresponding month of last year. Thus the output of pig in the Zollverein in November, 1882, was 276,000 tons, as compared with 262,000 tons in November, 1881. In the first 11 months of last year the aggregate production was 2,870,000 tons, as compared with 2,486,000 tons in the corresponding period of 1881. The works devoting themselves to the manufacture of railway plant in the Düsseldorf district have numerous orders on hand, and the same may be said of the manufacturers of boiler-plates. Buyers still maintain an attitude of reserve for bars and iron wire. The disproportion between the price of manufactured iron and that of raw material still continues. Three companies of some importance have just been established in Spain—the General Railway Credit Company at Madrid, the Iron and Steel Blast-Furnaces and Works Company at Bilbao, and the Railway Construction and Plant Company at Barcelona. The French iron trade has continued fairly active. The Creusot Works have a contract to furnish 200 locomotives to the Southern of France Railway Company, deliveries to be made between 1884 and 1893.

The aspect of the Belgian iron trade has not materially changed, the downward tendency in prices, which had been recently noticed, having apparently been checked. The principal works have still employment assured to them for some time to come, and their proprietors are accordingly generally satisfied with the state of affairs. Stagnation is the prevailing characteristic of business at this period of the year, although the spring will probably bring with it some change for the better. Pig has been well maintained. Business has not been done in casting pig at Charleroi below 37. per ton, and the difference of 2s. per ton has been well maintained. Refining pig has been firmly established at 27. 8s. per ton. Several blast furnaces have their production fully engaged, and it would be difficult to do business below these terms. Ordinary pig has brought 27. 4s. 6d. per ton, and mixed pig 27. per ton. In the Belgian Luxembourg a quotation of 27. 10s. per ton has been firmly maintained for casting, and one of 27. 4s. per ton for refining. Business has been easily done upon these terms, and the works being generally well engaged in the first quarter of the year lower rates are not likely to be accepted for the present by ironmasters. Iron has been generally well maintained in Belgium; but has shown at the same time no great animation. No. 1 has made 57. 4s. per ton, No. 2 57. 12s. per ton, and No. 3 57. 6d. per ton. Girders have brought 57. 12s. to 57. 16s. per ton. Plates have been a little more in demand, and a quotation of 77. 4s. per ton may now be regarded as the minimum. No. 3 plates have made 80. per ton, and No. 4 117. 4s. per ton.

The Belgian coal markets have not materially varied. Coalowners are generally pretty well satisfied with the state of affairs. Notwithstanding the mildness of the weather deliveries of coal have been relatively important, and this explains, of course, the good tone of the markets. Industrials continue to absorb considerable quantities of coal. The result of this is that concessions in regard to prices are only occasionally made, and quotations are generally firmly maintained. There is little news to communicate with respect to the German coal markets. Quotations for all descriptions have been generally well maintained; household coal has, perhaps, been in the great request, but industrial coal and gas coal have become scarce. Inundations have interrupted deliveries by water, and the extraction has been necessarily reduced in consequence in some districts. The impossibility of making deliveries by water has thrown more traffic upon railways, and a scarcity of rolling stock has been felt in consequence at several points. Coke has become scarce, and firmly maintained its price. The Paris coal trade has been rather feeble, and to secure more vigour in affairs it is necessary that the weather should become more severe. The stocks on hand appear to be considerable, and orders have rather fallen off; hence the temporary weakness in prices. In the principal French coal producing centres it has been necessary to diminish the extraction in order to prevent a further accumulation of stocks, already considerable.

HUNTINGTON COPPER AND SULPHUR COMPANY.—The directors have summoned a general meeting of shareholders to take steps for the voluntary winding-up of the company. The reasons for this step are that the mine has not come up to the expectations originally formed of it, that only one-fifth of the preference shares have been taken up, that certain claims in Canada are being pressed, and that three of the directors have resigned.

Original Correspondence.

GOLD AND DIAMOND FIELDS OF SOUTH AFRICA.

SIR.—Since my last letter I have been suffering from a slight attack of the fever so common in this place, and even now I am far from well. Business throughout the camp is still very dull, notwithstanding the splendid dividends paid by our *bona fide* companies. About two months ago I informed you that the Central Company were earning 15 per cent. for the quarter, but as they have only paid 12½ per cent. for the quarter perhaps some of your readers may be inclined to think I over-estimated the amount of their dividend; but such is not the case, inasmuch as, after paying 12½ per cent. for the quarter, they have in hand over 33,000*l.* towards the creation of a reserve fund, thus showing they could have declared 18 per cent. for the quarter if they thought proper to do so. The Kimberley Central is certainly a magnificent property, and in order to place the notorious Crystal Company on the same footing I expect shortly to see the Advertiser add a few more strings of imaginary diamonds to its front page, because it is only natural that every person should promote their pet schemes in their own way. Our waterworks are nearly completed, and by Christmas I expect to see the water running in Kimberley. I cannot say more in praise of this scheme than I have on former occasions. I believe it to be an unqualified success, and every person here connected with the undertaking is deserving of the highest praise.

Illicit diamond buying and stealing is said to be very much on the increase, and the only good of the Diamond Protection Association appears to be the providing of billets for a few worthless fellows. Since the passing of the new ordinance ladies are said to be specially liable to nocturnal visits, in consequence of which several respectable families are said to have left the fields. Occasionally a few poor, half-starved wretches are run in for diamond stealing, but the "big ones" are protected by a wire like the footlights of a theatre, only the wire is gold instead of copper. I am glad to say small-pox is rapidly disappearing throughout the colony, and if the Editor of the Advertiser gives over the comet business and sticks to white hats I have no doubt we shall see a revival of trade soon after Christmas. The new rush at Foster's farm does not appear to be of much value as yet, although I have very little doubt but that rich mines will eventually be found in this neighbourhood.

The news from the gold fields is unimportant, but I am expecting letters daily from several old diggers in whom I place implicit confidence. I have seen a copy of a prospectus which arrived by the Spartan of a new company which is being floated in England for the purpose of purchasing a certain property in the Transvaal. Now I have been over the said property on several occasions, and I certainly could not recognise any portion of the property from the prospectus. The prospectus speaks of placer ground and hydraulic mining as if the promoters were writing of some place in California. There is gold in the Transvaal, but I challenge any person to point out any placer ground in that province. I shall return to this matter again as soon as I am quite well.

CORRESPONDENT.

INDIAN GOLD MINES—SHAREHOLDERS' ASSOCIATION.

SIR.—Will you allow me the use of your powerful columns for the purpose of making a suggestion to the numerous shareholders who have lost money in the Indian Kingston and Sandhurst Mining Company, the suggestion being that in the interests of the shareholders a Shareholders' Association should be formed for the purpose of investigating two points, first, the properties and estates of the company, and their gold producing capacities, and, second, the application of the money subscribed by those responsible for its proper application. Having just returned from Pondicherry, South India, on a visit to Mr. Moore, I am in a position to speak of the actual condition of things both from personal observation and local report, and I am quite sure both from what I have seen and heard that the affairs of this mining company require minute investigation from their inception down to the present time. To exemplify my meaning I will give you some facts. Mr. Moore became managing director and a shareholder in respect of 200 shares on the faith of certain reports laid before him of the gold-producing qualities of what are termed the auriferous reefs in the Kingston and Sandhurst estates in the South Vynad, and became managing director of the company for a period of 18 months certain. He arrived at the works in September, 1881, and at once set about his work in earnest.

The following extract from the South of India Observer received this morning shows what he has done for the company:—
"Mr. Moore, the manager, brought with him a considerable amount of experience and practical skill from the Californian and other gold fields, and it is to be regretted that such a man had not a better claim to work. Mr. Moore started work in December last, and certainly kept the lead of any mine here in the amount of push and energy displayed. In July last, he had completed the erection of a splendid 20-head Californian mill with quite an ingenious method in the laying of the foundations, so as to obviate even a minimum amount of vibration. The excavations made to enable the mill to be put up are something stupendous, but the economy displayed in completing this expensive earth-work well deserves imitation by the managers of other companies, who have similar work before them. Mr. Moore has identified himself particularly in regard to the treatment of ores. Some months ago, when the Alpha battery was at work, Mr. Moore was specially engaged to treat the stuff which had passed through the stamps, and on that occasion he proved incontestably, to the discomfiture of Mr. O'Donoghue, who was a most persistent sceptic, that gold was obtainable if it was known how to treat the ore. I quite recently witnessed a most interesting process in connection with the extraction of gold from the pyrites by an original patent machine which Mr. Moore has invented for the purpose, and I was much surprised at the simplicity of the arrangement. I saw 250 lbs. of calcined pyrites put into the machine, and every particle of gold was taken out of it in the space of one hour at a cost, Mr. Moore told me, of only 6 rupees! A public trial of this ingenious contrivance will very soon be made, when I hope to be present, and will give full particulars."

Up to Aug. 11 last remittances for the purpose of erecting and completing the mill and works were, I believe, regularly made by the company to Mr. Moore, on which day, however, without any reason being assigned the remittances altogether ceased, just when success seemed assured. Mr. Moore wrote several pressing letters to the company stating the urgent need of supplies to pay the rent and various accounts for expenses incurred in and about the erection of the mill and works, to all of which communications he has only received formal acknowledgments. The consequence is he has been inundated with writs and actions, various persons out there holding him personally liable as managing director. Everybody on the spot sympathises with Mr. Moore's position, and speaks well of his ability and of his work. Besides the paragraph above quoted in the same newspaper—the South of India Observer for Nov. 25 the following extract appears:—

Deccan, Nov. 22.—The Indian Kingston Company has ceased all work for the present. It is only just to Mr. Moore to say that this is not the result of any fault of his. Comparatively speaking he was last in the field, but by dint of hard work, and amid many difficulties he erected one of the best if not the best 20 head battery, on the Californian system, but in July last, just as he was ready to commence crushing, the board, for some unaccountable reason, ceased remittances, and Mr. Moore's position ever since has been one of great difficulty, as he has been obliged to carry out many of his plans in the works at his own cost in the hope that his board would rally and send out more money. But none has come. The result is that the splendid mill stands where it is utterly forsaken, though a proof of the engineering skill of the manager. I had a hurried view of the works the other day, and could not help deploring the fact that no further progress can be made here for want of money.

Now, as a shareholder, I want to know why the remittances to Mr. Moore ceased just at the point when he was in a position to work and win the mines. And, also, what has become of the money subscribed by myself and the other numerous shareholders of the company; and why it is that the shareholders have not been kept informed of Mr. Moore's reports on the prospects of the mines and the requirements of the company. Since my return to England I have ascertained that the company is in liquidation, and I have recently received through my solicitor and brokers (not without considerable trouble) a list of shareholders in the company, by which it appears that 124,452 shares have been subscribed, and, I presume, paid for. Where is this money? I do not blame the directors as I have no right to do so without more definite information than I have hitherto been able to obtain. As far as Mr. Moore, the managing director, is concerned, I know that he courts the closest investigation into his conduct as the company's local representative; but, Sir, I desire to know whether it is not the fact that there was what I believe is termed a syndicate formed for promoting the company; if there was, I want to know what sum, if any, such syndicate received for

promoting the company, and out of whose pockets the money came. Perhaps some fellow sufferer who reads this letter will be able to enlighten the other shareholders and myself upon the matter. In conclusion, allow me to state as my experience in travelling through Southern India the prevailing impression there is almost universally that these mining companies are very little better than associations undertaken by clever promoters to catch the money of the unwary. I cannot do better than end this letter with an extract from a letter which appears in the same paper to which I have already referred. Such extract is as follows:—

There has been so much deceit about these Southern India mines, to the eternal disgrace of those concerned, that the truth is above all things what we shareholders wish to get at.

How is the truth to be ascertained? I say by an investigating committee, and if others are of my opinion I shall be pleased to meet them and give them the benefit of my experience.

Darwen, Lancashire, Jan. 9.

C. GREENWAY.

THE GOLD FIELDS OF VENEZUELA.

SIR.—Very few persons in this country have as yet realised the importance of the above, which are destined ere long, without a doubt, to attract more attention than they have hitherto done, and to a certainty to eclipse those of Australia and California. French and American mining adventurers seem to know more about them than we do, but English capital is now being brought to bear on them. The extraordinary results of the working of the El Callao Mine have at last opened our eyes, and I have no doubt but before very long new companies will be formed by the score. It is true that so far the Chile, and still less the Potosi, have done little or nothing for their shareholders, but I apprehend that before many months are over very different results will be shown. A large capital is required for working these mines. The expense of taking machinery up the country is something enormous, and labour is dear and not very efficient. The best thing to be done would be to construct a rail or tramway up to the mining district, such as the Cape Copper Company has done, which has made the fortune of the company.

A French company will shortly be working the Nacupai or Nouveau Monde, and happening to be in Paris last week I heard a most favourable opinion expressed of the value of this concession, and our neighbours seem to be fully aware of what may be expected of the Chile, Potosi, and Callao Bis mines when full stamping power is set to work. I heard more about these mines in Paris than in London. I think it of good augury that the French are embarking capital in them. They are not usually lavish of their money in mining enterprise, and look more closely to their francs and centimes than we do, but Venezuela seem to have some great attraction for them for which it is difficult to account except that the El Callao may have excited their cupidity, or that they know the country better than we do. At all events they could tell me more than I ever could gather in London, and certainly I have invested on the strength of the information obtained in the French capital.

London, Jan. 3.

W. B.

P.S.—Since writing the above I hear that the Potosi Company and the Callao Bis have both opened up a reef with 4 to 5 ozs. to the ton the former on the Peru lode, the latter on a lode supposed to be a combination of the El Callao, whilst the Chile is likely very shortly to return from 3000 to 4000 ozs. per month. If that is so the prospects of all three are very good indeed. Of the Nouveau Monde we hear nothing from the London office. It seems they cannot publish anything without authority from Paris.

PIERREFITTE MINING COMPANY.

SIR.—The Chairman of this company, at a general meeting of shareholders on Oct. 20, made some extraordinary statements by representing some ore dressing machinery put up while I was in the company's employ did not answer well, whereas everybody that really knows about the particulars of the matter, and who are impartial, knows the reverse of what the Chairman represented was the case. I do not know Mr. Urwick, but never did anyone speak more emphatic truth than he did at a former general shareholders' meeting, when he stated "they had not done justice to their manager out there"—alluding to myself. The mine's machinery, &c., have, the Chairman stated, been "inspected by a member of a firm of eminent mining engineers—the Messrs. John Taylor and Sons"—whose report the firm fully endorses. It states—"the south mine has acquired additional value by the discovery of a deposit of ore very much richer than hitherto found in the Pierrefitte Mines." Now who was it that advised the extension of the cable to and the working the South Mine? It was I that did it, and fought hard for it. How did this valuable discovery of ore in the South Mine come about? It was your humble servant that advised the driving the Discovery level where it is, dialled the ground, commenced and drove the level close home to the ore, when to my utter astonishment the board sent instructions to stop the end.

Relative to the North Mine, all levels driven by the present company were dialled, commenced, and driven by me, the driving of which resulted in cutting courses of ore in every level. All the levels driven by the present company were advised, dialled, commenced, and driven by me, and in every case the result has proved successful, both in the North and South Mines. It will readily appear, therefore, to the fair and impartial to what extent the company are indebted to me for the discoveries of ore represented by the Chairman to be of such great importance. Special attention is called to the very able manner in which the mine and machinery has been laid out at surface. Mr. Taylor reports further—"the two solid securities we have with regard to the enterprise is the condition and quality of the mine, and the means of bringing the ore down to the dressing floors. In these there has been no mistake." He—Mr. Taylor—makes a remark on the machinery generally, of which he gives a very good account, and it is very satisfactory to us that he endorses the efficiency and mode it is distributed for use. This does not look as if inefficient machinery had been erected, any way by me, and since the planning and laying out the whole mine and machinery was done by me, and after my designs and drawings, and actually erected by me and under my superintendence. It will readily appear under this head also to fair and impartial men to what extent the company are indebted to me for the able manner the mine has been laid out and machinery erected, which commands such high commendation from the firm of mining engineers alluded to by the Chairman. I would here remark, as regards the large water-wheel, a deviation from my drawing was recommended by, I believe, the interests of the ironfounder that made it. But it is agreed, I believe on all hands, the improvement belongs to the negative side of the question, on the grounds also laid out by me for the dressing jiggers. Jiggers have been erected since I left the mines which possess negative qualities which I do not father.

I will now come a little closer home, and preface the following remarks by saying I had not the shadow of direct or indirect interests in any ironfounder, merchant, or supplier of any kind of machinery or goods to the company, whether they were supplied from the Continent or from the United Kingdom. But my sole interest and aim was to advise what I considered the most economical, efficient, and suitable machinery that would best suit my employers' interests, taking all considerations into account; and even if some small portion of the machinery did not answer the purpose for which it was erected (which I most emphatically deny) so well as others, I was entitled to the credit of being sincere in the matter. I cut the ground and laid out the site for jiggers, but did not erect them there at all, which was the proper place, but was instructed to erect some in the most unfavourable position, to work under the most unfavourable circumstances, where not only the right speed could not be obtained ever, but often next to no speed at all, and therefore it was altogether unfair to expect the best results from any jiggers under such circumstances. The results, however, under these exceedingly unfavourable circumstances were considered highly satisfactory, and have never yet been surpassed by any jiggers erected since at Pierrefitte Mine. Although the latter have been put up in the best possible position I prepared for them, and driven by a distinct power devoted entirely to them to give them the right speed. Wherefore then the great anxiety to make the jiggling machinery put up under

my superintendence the pack-horse for bearing the burden? Why the expectations of the shareholders have not been realised? There are several circumstances connected with the case. Space, however, will not admit of my inserting them in this letter. I will, however, insert one or two. Before I knew there was a Pierrefitte Mining Company in the world, prospectuses of that company had been issued containing statements to the effect that 40,000*l.* worth of ores were at surface on the mines which had been left by the Royal Asturian Company, from whom the mines had been purchased. It was quite natural the shareholders would expect the fulfilment of the realisation of such a large sum for ores high and dry at surface, with little to do but turn their value into cash, and I venture an opinion it was quite natural for those who were responsible for the statement that 40,000*l.* worth of ores were at surface should be anxious that it should be realised. And I will venture another opinion—viz., that the man is not yet born who can prove that the statement that there was 40,000*l.* worth of ores on the Pierrefitte Mines when the present company took it had foundation in fact. And it would do any man's eyesight good to see the jiggers that could make it so.

The Pierrefitte ores are zinc ores, or blende, and a combination of zinc ore and brown hematite iron ore, which is generally magnetic. The lead ores are a combination of zinc, lead, and bright magnetic iron ore. The latter is so closely associated with the zinc and lead ore in the lode, and being of precisely the same colour as lead ore it puzzles the experienced eye to tell one from the other by sight in the lode. It has, no doubt, deceived many, and may deceive many more. It maintains its colour through all the processes of dressing, and when put to pile is about identical in appearance with the lead and zinc with which it is so closely associated as to be inseparable by ordinary dressing. Four-fifths of the Pierrefitte lead ores are composed of this low grade product, and the jiggers above referred to failing to transform it into valuable ores, and thereby perform the impossible, are made the pack-horse to serve a very grave purpose which will not wash. The kind of jiggers I erected at Pierrefitte and those erected since I left that company's service were both worked at the Great Van, where the merits of both machines had the fairest opportunity to be thoroughly tested, and were so tested. The results were that those sort of machines erected since I left Pierrefitte had no chance against the same sort I erected there, and in consequence were thrown out of use entirely (at the Van).

At Shepherds the same kind of jiggers were put up as those the present manager put up at Pierrefitte. The board having reason to complain of the inefficiency of the jiggers at Shepherds the manufacturer pleaded, it is said, his machines had not fair play, whereupon the board consented he should send his own engineers and ore dresser, which he did, and the results were the machines gave 100 per cent. worse results than they did in the hands of the company's own dressers—the manufacturer having failed entirely to demonstrate the efficiency of his jiggers, but succeeded in making a bad matter worse, and the company's dresser had to take charge of the machines again. The following is what my informant says about them (speaking comparatively of course):—"So much for —'s machinery. It is not worth a cent. It is too paltry. It is very nice to look at working, but it would not do for dispatch." The Chairman states—"We have appointed a first-rate dresser from South Wales, well acquainted with the structure of machinery and its use, and he is now giving his best attention to carrying that into operation." I have not the slightest remark to make against this engineer and ore dresser, but as it appears this is the very same engineer and dresser that were sent to Shepherds as doctor to the same kind of machinery as has been recently put up at Pierrefitte, and who is said to have so signally failed to make it give satisfaction there—viz., Shepherds—it looks very significant that he is sent (to Pierrefitte) for more reasons than one. It is suggestive whether the symptoms of complaint experienced in these machines elsewhere do not exist in them at Pierrefitte. It is an uncontrovertible fact that they have not performed at the Pierrefitte what was promised or anything approaching to it. The board listened to men out there who knew next to nothing about mining or ore dressing, and who are unprincipled enough to say anything to carry an object in my opinion. They firmly represented they could by the assistance of the jiggers they have put up make this combination of bright magnetic iron ore, blende, zinc, and lead ore realise after they had dressed it 15*l.* per ton. Now the Chairman was told at the time these statements formed a bubble that would burst directly it were tested. It has been tested, and a bubble it has been found to be. To make this class ore realise 15*l.* a ton the dressing machinery put up to do so has been a complete failure. Nothing can be more patent than this fact. With the stopes underground full of ore already broken, nothing to do but tram it off the mine, courses of ore cut in the levels to work upon large quantities of this low grade ore at surface that will realise 15*l.* per ton, machinery erected capable of dressing thousands of tons in a few weeks, where are the corresponding ore sales? How is it that second mortgages are to be issued instead of large dividends made. I am willing to believe the Chairman would not knowingly make misrepresentations, but considering the whole mines and works, machinery, &c. which have commanded such high commendation were designed, laid out, and erected by me and under my superintendence, it is not a little surprising how in his speech he could pass over all this and ignore it, and put the fault on some jiggling machines that were erected while I was in the company's employ for the non-realisation of values for ores which, as before stated, the man is not in my opinion born who could prove had foundation in fact. It has been proved abundantly the kind of jiggers I erected there are A 1. I have no interest for or against anybody's dressing or other machinery any further than in the using what will answer best. That the Chairman is being misled in this matter is my opinion.

GEORGE RICKARD.

COLORADO GOLD MINES.

SIR.—The Bonanza and Union Tunnel Mining Company, Gilpin County, which is one of the largest mining undertakings in the State, are constructing two tunnels through two mountains to intersect all the gold bearing veins (about 60), embracing about 1½ mile of the celebrated gold belt. The Bonanza Tunnel penetrating through the centre of the Maryland Mountain is now in 1100 ft., and has already cut through 10 distinct veins; the tunnel is 8 ft. wide and 7 ft. high, and will be extended over 3000 ft. further through this mountain, the highest point of which will give about 1000 ft. of backs to work on the veins. Several of the veins already intersected have been drifted on a considerable distance, all showing large quantities of ore of good average quality. On the Maryland vein, which has been drifted about 500 ft., a rich and important discovery has lately been made by striking the south branch of this Maryland vein, and is proved between 9 and 10 ft. wide. Prof. Gray, the State assayer, has made several assays from this new find with remarkably rich results, the first assay giving over 26 ozs. of gold and 4.70 ozs. silver per ton; the second assay giving over 21 ozs. gold and 3.75 ozs. silver; the third assay over 11 ozs. of gold and 2 ozs. silver; fourth, 4 ozs. gold and 18 ozs. silver per ton. The Union Tunnel going south through the Casto or Bates' Hill is in 650 ft., and has cut through six veins. The highest point of this hill will give about from 300 to 400 ft. of banks for stoping. The mines are in a position to at once commence delivering to the batteries 50 tons of ore per day, and in three months' time will be able to deliver 100 tons per day, and by the time the tunnels are completed through the two gold mountains the company will be able to run out 500 tons of ore per day, and as the ground gets more opened that quantity can be largely increased on; in fact, from all appearances, it is only a question of getting sufficient machinery to reduce the matrix, when the quantity of ore to be supplied is apparently unlimited. Competent engineers have estimated that there is not less than 7,000,000 tons of ore available for working by this company above the tunnel level, and in all probability much more below that level.

The Bonanza and Union Tunnel Company may be classed as one of the greatest mining enterprises of America, and in a short time, when machinery has been erected, will be ranked amongst the great dividend mines. The general average of this celebrated gold belt of Gilpin County is about 1 oz. of gold and 6 ozs. of silver per ton of ore, and from the small area of ground already worked on in

this district \$40,000,000 in gold and silver have been produced since its discovery. The Bonanza and Union Tunnel Mining Company embraces fully one-third of all the gold-bearing veins of Gilpin County, which is pronounced the richest section of gold country in America, and taking a very moderate estimate of the future yields of ore, as compared with the past, it may be fairly calculated that there is not less than \$100,000,000, or (say) 20,000,000*l.* sterling, in the ores to be worked in ground belonging to the company.

The company now in operation has been organised under and by virtue of the laws of the State of New York, in the United States of America, with a capital stock of \$2,000,000, fully paid-up, and non-assessable. To carry out the purchase of these extensive mines, works, machinery for driving the air drills, &c., to complete the tunnels and put up extensive crushing-mills and other appliances for carrying on the works on an extensive scale, gold bonds bearing 6 per cent. interest have been issued for \$500,000, or (say) 100,000*l.* According to the prospects and favourable position of this mine, the company anticipate being able to commence with an annual profit of 50,000*l.* to 100,000*l.* after machinery is erected. Three-fifths of the paid-up capital stock and gold bonds of this celebrated Bonanza and Union Tunnel Mining Company have been secured by Mr. Thomas Cornish, the well-known mining engineer, who lately made a trip to Colorado, and exercised his practical experience in securing this legitimate and truly valuable gold mining property to place on the English market.

CASH.

ST. JOHN DEL REY, AND ITS PROSPECTS.

SIR,—You will pardon me for calling attention once more to my predictions respecting the St. John del Rey Company's Mine, as at the time I first gave publicity to its failing condition and said that, if the facts were known to the public who were stockholders, stock would be put on the market and could be dealt in, my correspondence called forth the maledictions of interested parties in London, in which you were forced to join. I say forced; I think I am right. I was called a conspirator, and one correspondent likened me to a vulture. I have reason to believe that that gentleman was the author of an article called "The King of Mines," and I also have reason to believe that he is operating in the stock. In view of the ridiculous assertions and predictions set forth in the above-mentioned article—so misleading, so utterly without foundation in fact, and contrary to all the evidence before him—I again ask, is it more sinful to operate for a fall, stating actual facts, than for a rise, and circulating wild statements such as are given in the letter of "Investigator." There was no foundation for such estimates or hope for the promises given. It, indeed, surprises me that the London manager should allow such an article to go unanswered, having, as we all know, a strict regard for truthful statements.

What are the facts about the mine? It is well understood now that the produce is falling off, and that the company are now working at a loss. Culaba is not paying expenses, which are heavy. I propose to keep the letter signed "Investigator" before the public side by side with results. I warned the holders of stock when it sold at 250, I repeat my warning now, while a little might find a market above par. More anon.

MINAS.

THE ALMADA AND TIRITO MINING COMPANY (LIMITED).

SIR,—It is strange, seeing the readiness which the public run up the prices of mining shares, such as Callao BIs, from a discount of 75 per cent., *i.e.*, 5s. per share, to a premium of 25 to 30 per cent., *i.e.*, 27s. 6d. per share, on vague telegrams of a "lode having been cut," notwithstanding the mine has never yielded an ounce of the precious metals—that the shares of a really productive and profitable mine like the Almada and Tirito should be neglected and selling at a discount of 37½ per cent., *i.e.*, at 13s. 6d. for 1*l.* share. There is no accounting for such anomalies as this, and they continue to recur, notwithstanding that the buyers burn their fingers on nearly every occasion. In the last report of Mr. Clemes, the manager of the Almada and Tirito Mine, he states that in the Providencia drift the lode produces 8 tons per fathom of milling ore, worth 30 *ozs.* of silver per ton; and in San Juan the lode produces 11 tons of milling ore per fathom; he states, moreover, that he is prepared to reduce (*i.e.*, extract) silver at a very rapid rate, faster than he has ever done before, as soon as he could get a sufficient supply of salt, and that in November and December there would be a large addition to the stocks of ore on hand, but that he was only running one furnace at present, as it was not worth while to run more until he had a stock of 15 tons of salt on hand.

In a previous letter, received about a fortnight ago, Mr. Clemes states when all his furnaces are in operation, he could "leach" *i.e.*, extract the silver—from 60 tons of ore per day, producing 30 *ozs.* to the ton; and as it appears he has now got large stocks of ore ready at surface, the future returns of silver must be very large. 60 tons, yielding 30 *ozs.* per ton, give 1800 *ozs.* per day, the money value of which, at 4s. 2d. per *oz.*, is 375*l.* per diem., or for a month of 28 days, 50,400 *ozs.*, of the value of 10,500*l.* At least 20 per cent. of this will be profit, and at this rate the annual profits will be upwards of 25,000*l.*; and as, taking the shares at their present market price of 12s. 6d., the whole mine is selling for only 81,250*l.*, the profit that will shortly be made, according to the foregoing estimate, would pay 30 per cent. on shares purchased at the present quotations.

It is very difficult to get the public to take the right view of stocks that are unduly depressed, as I know from the indifference displayed when, through your columns, I advocated the purchase of Copiapo shares at 1½ per share, which are now 3½, and Panulillo Copper at 2½ per share, which are now 6½. I said, however, the public would have to buy the shares—and they have done so until the price has been carried higher than my expectations. I say the same of Almada and Tirito shares, they must go to 30s. per share, at least; and, when they do, I shall hear people recommending them as cheap who will not now look at them—exactly as they did with Copiapo and Panulillo. I may add that the Almada Company have in hand a balance of unexpended capital and reserve fund amounting to 21,344*l.*, and accumulated profits amounting to 5600*l.*; and as it only requires 9750*l.* to pay a dividend of 1s. 6d. per share, I confidently expect an intermediate dividend of that amount will be declared not later than April next.—Jan. 11.

ARGUS.

SENTEIN MINING COMPANY.

SIR,—Those who have watched the rapid and successful development of the masterly lode on which this mine is placed must be struck with surprise. In the report made by Capt. Rickard on this property in Feb., 1881, on behalf of Messrs. John Taylor and Sons, his estimate of reserves of ore is from 30,000 to 40,000 tons, and his lowest estimate of profits to be made in working the mine for nine months of the year, taking 25 days to each month, is put down at 5000*l.* to 6000*l.*, an amount sufficient to pay upwards of 10 per cent. per annum on the capital of the company, or the par price of the shares. According to a recent statement of the present manager of the mine, to whom, perhaps, may be partly accorded the credit of having brought the concern into its present prosperous position, the reserves are now estimated at from 60,000 to 70,000 tons of silver-lead and zinc ores, notwithstanding that during the past year they have extracted at least 12,000 tons of ore, which have produced several thousand tons of mostly splendid quality marketable silver-lead and zinc, which, I understand, will show a significant profit on the year's working, notwithstanding the enormous quantity of dead work which has been accomplished within the time.

The principal workings of the mine consist of five day levels driven some hundred yards from the side of the mountain on the course of the lode. The upper levels have yielded fabulous returns and profits, but what may the shareholders expect during the current year when the fact can be stated that about seven weeks ago the miners, in putting out a cross-cut on the No. 4, or St. Eugene level, intersected the main part of the same lode which produced such enormous wealth in upper workings, and have come upon a splendid course of ore from 12 to 15 ft. in width, and no doubt now exists—indeed, it is a foregone conclusion—that the lode will now be found of equal richness and width in the No. 5 or St. Barbe level, which is the deepest. It is confidently expected by those who are acquainted with the mine and the district that shortly after opera-

tions are resumed (which now that the holidays are over and the weather more favourable I believe will be in the course of a week or so) this concern will be placed in the first rank of European mines. The great growth of railway enterprise in the Pyrenees must cause a still further expansion of mining industry now that one or two genuine successes can be announced brought about by the application of English capital.

The Pierrefitte Silver-Lead Mining Company is, I think, likely also to make a name for itself, as large profits are now being made. I desire to draw attention to a letter inserted under the heading "Cape, and Copper, and Sentein," in the Journal of Aug. 12, in which I wrote:—"We often admire the way in which a scientific discoverer will push out boldly into the dark with the confident expectation of reaching a good result. Having laid hold of some grand principle, or having made himself sure of some leading facts, he is quite sanguine as to the consequences that will follow. It is through this habit of mind that the most important discoveries in mining have been attained."

Mining has now become a science which, when properly studied, is capable of advancing inductive theories to practical results, the proof of which statement can be verified by the recent discovery in the Sentein Mine, which is under the management of the most practical and experienced firm of mining engineers, which should inspire confidence amongst shareholders.

ONE WHO KNOWS.

London, Jan. 9.

HYDRAULIC MINING—No. I.

SIR,—Special attention is, and has been for some time past, directed to the successful results which have attended the operations of hydraulic mining in the United States, and while large areas of unbroken ground are being taken up for a similar purpose in new districts in Colorado, Montana, and Idaho the older organisations which have for a period of over a quarter of a century been operating in the numerous canyons and gorges of the mountain ranges and spurs of the Sierra Nevada, are being threatened with suppression. But threatened interests are proverbially of long duration, and it is reasonable to assume that the source from whence a not inconsiderable portion of the present gold supply is obtained will not be prematurely extinguished. Of all the known processes in connection with the extraction of the precious metal from mother earth, that of hydraulic mining possesses perhaps the greatest interest and novelty. It is simple in its operations, and given an ascertained value of the ground to be operated upon it is capable of producing large returns.

The advancement of placer mining from the cradle to the powerful monitor, which is now used in hydraulic mines to tear down and wash off the high banks of gold-bearing gravel was accomplished by easy grades. The various stages of development are represented in the long tom, sluicing, and ground sluicing. The long tom was a box, shaped very much like an open coffin, with the foot knocked off, the bottom of which was lined with riffles, running parallel with the sides. Into this box, the gold-bearing earth was dumped, and a stream of water was turned on at the head, while the pay dirt was well stirred with a sluicfork. The stream of water served a double purpose—it released the gold contained in the dirt, which, of its own gravity, dropped between the riffles, and it washed off the lighter earth and gravel. The coarser gravel was carefully washed and thrown out with the sluicfork. The escape of the finer gold at the mouth of the long tom made it necessary to add other long and narrow boxes to the lower end of it, much after the manner of an ordinary flume. Riffles were placed in these boxes also for the purpose of arresting the particles of fine gold as they rolled with the stream. This flume was called the sluice. The ground sluice consisted of making the bed-rock, on which the pay dirt rested, perform the duty of sluices, the stream of water used for washing away the dirt being constantly trained against the bank. The action of the water was precisely the same as that performed by any stream against its natural banks where they happen to offer resistance to the current. The miner assisted the flowing water by a judicious use of his pick. When the conditions were favourable ground-slucing was a great improvement on all other methods, inasmuch as a much larger quantity of pay-dirt was removed with the same amount of water and manual labour.

But with the discovery of much larger areas containing auriferous gravel, the gold being finely disseminated throughout, hydraulic mining, or "hydraulic," came into operation. Whether the miners of Australia or California are entitled to the merit of the first introduction of the system of hydraulic mining is a question which need not now be discussed. Most probably with evidence of the early exhaustion of the drift claims and superficial alluvial deposits hydraulic mining may have been adopted at about the same time in both localities.

The *modus operandi* in Victoria is as follows:—

The motive power is obtained from a reservoir which receives the drainage of 80 to 100 miles of country. A feeding dam is excavated about a third of a mile from the principal scene of operations, which is supplied by a race cut from the reservoir. Another race is cut from the dam to the top of a hill, from whence the water is conducted along a flume to a height of about 30 ft. above the workings. From the point of the flume a pipe is carried perpendicularly to within a few feet of the ground, and from this pipe another pipe (this time made of canvas to secure flexibility) is laid down to within a few feet of the earth to be removed. Previously a large cutting about 15 ft. in width was carried along the gulch, and thus having secured a good face in one direction a tail race, half a mile in length, was cut through the old ground on the opposite side, in order to secure a complete running off of the water. At the end of the canvas hose a nozzle, about 3 ft. in length, is fixed for the water to pass through, and this nozzle is directed by one man against the earth to be removed. Some idea of the force with which the water strikes the earth may be gathered from the statement that 700 gallons of water is delivered every minute, and that about the same time suffices to displace avalanches of gigantic size. The director of the nozzle first undermines a part of the face perhaps 15 ft. in length.

A short time suffices to create a gutter about 1 ft. or 18 in. wide, which is followed by the displacement of all the earth above up to the surface, a distance of about 12 ft. This comes tumbling down in front of the operator, who, by spasmodic jerks of the nozzle, washes the lump into fine sand in the short space of a few minutes. The gold deposits itself in the bed-rock, but the debris is carried off by the force of the water into sluice-boxes, which are laid down in the tail-race. About 100 ft. from the commencement of these boxes two men are engaged in clearing away the stones and sand, thus preventing the boxes from being choked by the stuff which is continually being carried along them by the water. After washing 7000 or 8000 loads of dirt at the rate of 1000 loads per week the water is turned off, and the surface of the bed-rock dug up a few inches. The stuff is collected into a heap, and worked by the hydraulic process into the sluice-boxes, the first of which, being perforated, catches all the gold. A few days are sufficient for the clearing-up part of the arrangement, when the water is again turned on, and the operations commence afresh. Of the profits of this scheme it may be stated that material that will average from 2 to 3 grains (troy) to the load will pay handsomely.

In California operations in hydraulic mining are conducted on a much greater scale. The heart of the hydraulic district is what is known as the Yuba Ridge, which is an elevated spur of the Sierra Nevada, thrust into the Sacramento Basin through Nevada and Yuba Counties. It lies chiefly within the boundaries of Nevada County. The source of the water supply is a distributing reservoir, a large artificial lake in the vicinity of the mine, but situated at a much higher elevation; the water is conveyed in ditches and large iron pipes, 15, 22, or 30 in. in diameter, to the monitor. The gravel removed by the stream is led through the ground-slucing into the deep open cuts that have been excavated with powder and pick in the solid bed-rock. These open cuts are from 15 to 40 ft. in depth, and from 4 to 6 ft. in width. They discharge into the tunnel excavated through the rim rock, and the debris is then delivered to a system of sluices and under currents, by which it is expelled at the dump.

Great care is taken to prevent the escape of the gold with the out-

pouring flood and debris. The tunnels and open cuts are paved with heavy boulders or heavy blocks of wood, which pavement has to be frequently renewed, owing to the enormous attrition to which it is subjected. The sluices and undercurrents are paved with wooden blocks 1 ft. thick and 18 or 20 in. in diameter, the end of the fibre of which is presented to the action of the flowing water and debris. Every few weeks these blocks are so far worn that new ones have to be substituted. The forest timber growing on the surface of a hydraulic mine is, consequently, rapidly destroyed to supply blocks for riffling. In the space between the boulder and block pavements the gold finds a lodgment. The undercurrents are a very useful and ingenious device to utilise the immense fall between the mouth of the tunnel and the bottom of the ravine, into which the tailings are dumped. Without them miles of sluices would have to be constructed and maintained at great expense, and the separation of the gold from the gravel would even then scarcely be as thorough. The undercurrents are a system of zigzag sluices placed underneath one another, at distances of 40 or 50 ft. apart.

P. A. EAGLE.

MINING IN SPAIN—No. II.

SIR,—We had now passed over a small eminence, and came again to a broad valley, through which the River Gebalo passes. Now, in summer this is merely a small stream, but there were abundant indications to show that when the snows from the Montes de Toledo melted they would swell it to a broad and furious river. After wading it we found ourselves in very fine grazing land, having here and there groves of oak and other trees, which gave it the appearance of a vast ornamental park; in the distance we noticed a number of cattle feeding. My companion had been silent for some time, and to me appeared anxious and uneasy. This I at first set down to his reminiscences in passing over ground where doubtless he would have quaked before, but his anxiety seemed to increase after crossing the river. I could not refrain from asking him at length what was the matter. He replied "nada" only, that this was the ground where the wild bulls of one proprietor were reared for the bull ring, and if they happened to see us they would probably charge us, owing to their inveterate hatred of everything in the shape of men and horses. I did not much relish the idea of turning amateur bull fighter on the spot—in fact, I felt very much like being afraid, and most sincerely repented of my folly in rushing after a gold mine unaccompanied through so many slippery causeways. However, once in for it, it must be carried through; besides, it would have been quite as dangerous to go back as to go on since we were now fairly in the mesh; there we remained still, some three-quarters of a mile to get over, ere we should be out of the peril. We made the best way possible on our lazy mules; we were not, however, nearly through, when one of the herdsmen shouted to us to be careful, and to alter our route since we were riding direct to the wood where a number of bulls were shading themselves; whether they scented us or whether the flies were busier than usual I cannot say, but the fact is that one of the great brown monsters tore out from amongst the trees, and commenced to bellow and paw the ground in a terrific manner; but another, which probably was of a higher category in bull caste, not seeming to relish this disturbance of his siesta rushed at his bellow, omitting to look our way; their heads came together with a crash, and there was a terrific struggle. Our roadsters not caring to be in such close proximity to what appears to be their natural enemies, started at a gallop with little pressing on our parts, and soon bore us out of that danger. On attaining the next ridge, which commanded the valley, we saw such a scampering and medley amongst the bulls as it may not be our lot to see again. We had only escaped in time.

We had now been riding seven hours, and both man and beast under that blazing sun felt fully desirous of a short rest. We had, however, to push on to the next town before doing so; this we reached at noon; here we halted and baited. Our road to the present, whether accidentated or level, always passed over alluvium, thickly strewn with pebbles, composed principally of the lower Devonian conglomerate, quartz, and quartzite. Las Herencias, which we had passed in the morning, seemed built throughout with large pebbles, with earth mixed with chopped straw. The town we now reached, Belvis de la Jara, was identical in its construction, though larger. This town has a population of 2400; it is comparatively clean; its inhabitants are throughout engaged in agriculture, there being no other industry than that of the cultivation of cereals and stock raising. On leaving this place we commenced to ascend the Montes, which we continued doing for an hour, coming at the end of that time to a plateau covered with dwarf oak and rhododendron, which took another hour to cross. I estimate this plateau to be about three miles in width (which was our line of route) by from 10 to 12 miles in length, practically level throughout, and covered too, throughout, with growth of the same dwarf wood. The Montes de Toledo seemed to rest upon it towards the east and south, but it terminated on the west, forming the boundary to a valley far below it; it seemed to be composed, too, of alluvium, but the stones that were carried in it were as jagged as when they were broken from their original rocks, proving that they had been deposited with but little rolling, and consequently by another element than water—ice—a glacier from the Toledo Mountains.

We went directly for one of the ranges, which my companion informed me held the mine, entering and following for a distance of about two miles a gorge which had been formed by water; this gorge allowed me an excellent opportunity of examining the sections. The hills were capped by a bed of limestone. There were abundant blocks of this in the gully that had rolled down from the heights. I found it to be limestone of the Devonian series, and after examining a good many blocks I was at last rewarded by finding a "spirifer mucronatus," thereby fixing its exact position. I found the strata in the gorge—*i.e.*, the mine strata, very tilted, whilst the limestone capping was nearly horizontal, proving that the convulsion which tilted the former occurred prior to the depositing of the latter—*i.e.*, between the Silurian and Devonian, equivalent to the Hunsrück system. The sectional strata consisted of a very hard siliceous conglomerate, quartzite, slate, quartz, and schistose. We had to go over the hill to reach the mine, which was situated on the opposite side to the gorge. From the enormous quantities of attle and broken out debris and stone, my first impression was that the whole mountain had been turned inside out; this debris was from the same sections as I had already examined in the gorge. A stack of about 30 ft. in height upon the property seemed, from the desolation around, to be very out of place. Money at one time or another had been expended here with a lavish hand. There were warehouses, dwelling houses, offices, a laboratory, engine and boiler house, a grinding house, with a couple of heavy edge runners, and another having several amalgamators of a unique type. There were heaps of crushed quartz, and other heaps of like mineral to be crushed. The engine was a small oscillatory one; it had been reported to me to be 10-h.p., but by my calculations I could barely make it reach 4.

As it was too late to go into the mine that afternoon, I determined to see what the crushed stuff was like. I, therefore, looked up a pan, and got my guide to point me out what in selecting had been considered No. 1 ore pulverised. After washing six pans of the stuff, averaging 10 lbs. per pan, I obtained four very small specks of gold; this was No. 1 stuff. I made a thorough examination of a pile of uncrushed ore; some few pieces had small specks of gold in a ferruginous bedding. This was the rule. The exception was one small piece (which I have now in my possession) wherein the gold was embedded directly in the quartz without any indication of iron around it. The gold in the ferruginous bedding would probably have been liberated by the decomposition of iron pyrites, whilst the free molecule in the quartz would have been deposited thus on its formation; here, then, I have gold in both forms, but in either case free gold, since the pyrites at the present working level has been completely decomposed, and no sulphide remains. Mining here could be carried forward by adit to a further depth of 200 metres, provided there be paying quartz. That is the rub, which will be decided to-morrow.

After getting as many particulars as possible respecting the property, I determined to commence my underground work at four the next morning, and requested my host to make the requisite preparations for doing this. A report had been handed me upon this mine at the time the offer was made me. In this report I found it represented that "there are a multitude of proper parallel quartz lodes,

having a thickness of from $\frac{1}{2}$ metre to 1 in., distant from one another from 4 to 8 metres, with numerous leaders and branches, which are much richer than the lodes proper. That the constant average percentage of these minerals is from 6 to 7 drams per 100 lbs. of quartz. That selected samples assayed in the Madrid School of Mines have yielded from 13 to 54 ozs. per quintal. That the existing workings, ancient and modern, are considerable, the principal ones being 26 galleries and 23 pits in working order, on about 70 lodes and veins, extending 2114 metres. That the two principal adits, Dos de Mayo and S. Felipe, have tramways laid over 757 metres, with the necessary ramps for working. That at the foot of the hill there is a stream, whose waters are utilised for the working of the mines. That wages are low, and the approximate cost of extraction of 1 ton of quartz will be 120 reals, besides many more particulars and details, which will go far towards showing this mine to be a veritable El Dorado.

We commence our survey at four o'clock, accompanied by a couple of hands, with tools, ropes, ladders, &c. The entrances to the adits had locked doors; the ways were quite secure, and in a good state of preservation. The strata were well defined and very regular. I need not go into details respecting them, sufficient to say that there are a large number of small quartz veins, varying from $\frac{1}{2}$ metre to 1 in. I took fair samples of each, numbering and packing them as I proceeded; but out of the whole number, and after careful examination and assay of them, I could only find gold in one. That one is the 2 metre lode, and is in contact with the vast conglomerate bed, and overlying it. About 250 metres in length by 20 in height (including two levels) has been stoped on this, which seems to be the principal point where stoping has been done. This would have given 6600 tons of mineral. The average yield indicated in the report referred to is 6 to 7 drams per 100 lbs. of ore. The above quantity of quartz should, therefore, have yielded 65,340 ozs. of gold. This quantity would certainly have made some stir and left some sign, even though it were nothing more than tradition. All that I could hear had ever been extracted was some 80 ozs. I am satisfied the former quantity has never been extracted, and consequently the reported average is an absurdity. There are a great number of headings and galleries all driven without any apparent object, and without benefiting any others than the contractors. Money seems to have been most recklessly outlaid, without any definite object. There is sufficient gold to tantalise, the quartz in depth might improve, the fine show at the Madrid office might bring some gold to the mine, too. All is problematical, except the fact that no gold to pay working expenses will be got out of it at the present level of the workings. A very large sum will have already been swallowed up by it, and it remains as hungry as ever. I forward you by sample post specimens of the quartz broken out by me, to compare with like specimens from the Indian gold mines, which you will probably have by you. In looking at these please bear before you the fact that the gold is not distributed through the thickness of the vein, but is only found on the conglomerate contact side.

Within six miles from here there are some excellent lead mines, which were formerly worked for General Prim, and yielded abundantly, but since his melancholy death they have been stopped, and there seems but little prospect of their being again worked by his family. I examined them as far as I was able, and shall probably recount you my impressions at a future date. My return journey was to me most interesting, since I followed another route to that by which I went; but as the incidents connected therewith will hardly come within the scope of your valuable Journal, I must refrain from enlarging any further upon the matter.

J. A. JONES.

GOLD AMALGAMATION, AND THE SICKENING OF MERCURY.

SIR,—In all dealings with mercury some loss is expected, as a matter of course; but it does not necessarily follow that the loss is always accurately made known, even to those most interested in such loss. So of appliances used in the amalgamation of gold and silver with mercury; conflicting interests, as a matter of course, lie at the bottom of much open criticism, and create thereon considerable inaccuracy of description, &c. Inaccuracy of this kind, however, does not always result from ill-nature. It is oftener the result of superficial knowledge of the subject reported on. Too frequently, alas! it springs from a wilful suppression of the truth, or that portion of a truth which touches or underlies the true merit of the thing under notice. Often it is engendered of a satanic desire to ingratiate self by the traduction of others. A very reputable heathen of the olden time said there was no more contemptible conduct than serpentine meanness of this description. The heathen was right; disreputable Christians to wit, on the contrary, notwithstanding.

I often feel astounded, and I have written it more than once, at the veriest modicum of trouble people, and many intellectual people, take with the nature of a proposition or a truth. At the outset of an enquiry all seem pervaded with honesty of purpose—all get as far as asking "What is truth?" What then? All scudaddle, as Pilate did, without waiting a second for an explanation of the question; wash their hands of it, as something to be well rid of if not altogether, at all events, for the time being. They seem not at all to know or to have forgotten if they ever had known that science is the search after truth; that truth involves both mental and verbal truth; that mental truth is the joining or separating ideas as they agree or differ; that verbal truth is the affirming or denying by words, as the ideas they signify agree or differ; and that by travelling on these lines of thought we are enabled to detect fallacy and error, which, by the way, are by no means convertible terms, as some fondly imagine. Pardon me a little further explanation. Error I take to be merely mistake of judgment in giving assent to that which is not known truth. Fallacy is argument apparently conclusive, but in reality not so, which, when designedly formed to mislead is sophistry. Now, as misrepresentations and verbal inaccuracies of description (of apparatus especially) are more allied to fallacy than to error (proper) I shall be content with a word or two thereon.

From a rather lengthened experience of men and things I have concluded that the two chief sources of fallacy are—False facts, and false reasoning. (1.) As to false facts—When alleged facts are untrue; when facts not relative are adduced; when important facts are omitted; when opinions only are adduced as facts. (2.) As to false reasoning—In applying sound principles to facts not relative, in deducing conclusions not following from those facts and principles. (3.) I may add that as to overt acts there is sometimes in experts want of skill or will, or of both, to utilise facts in possession. In letters from high latitudes, in your issue of the 30th ult., are references to my proposed method of amalgamation. Mr. Jas. G. Green, superintendent of the Organos Gold Mines, United States of Colombia, writes thereon, under date Nov. 1. The letter is good humouredly written, and therefore demands instant notice. The two principal subjects of Mr. Green's letter are—(1.) My method of preparing mercury. (2.) The Britten-Readwin amalgamating pan. Of the first Mr. Green courteously writes:—

It is pleasing to me, as it must be to all other gold miners, to note that Mr. Readwin has discovered a chemical process whereby the sickening and flouing of mercury is prevented in treating certain descriptions of ores. . . . If by using Mr. Readwin's preparation of mercury efficiency in treating pyrites and other difficult minerals can be enhanced there is no doubt whatever that a great demand will spring up for the article in all parts where gold is mined, and thus Mr. Readwin's long period of labour in this direction will meet with the reward it so richly merits—the veritable salts of gold.

Pleasant reading this, and encouraging, so far as it goes. It was some blundering idiot who originated "fair words butter no parsnips," for, as Thackeray wrote, "half the parsnips of society are served and rendered palatable with no other sauce." With generous hand having buttered my parsnips, Mr. Green repents him instantly of his prodigality. *Mirabile dictu*. He gets up steam, opens his whole battery at me, and splashes my inoffensive toys all over with muddy water. Let us see what Mr. Green writes on the second subject of his discourse. The allegations against the Britten pan are 28 in number:—

1.—It will be found to be a very ineffective machine.
2.—Certainly one of the most costly that could possibly be devised.
3.—My first experience of the Britten pan, as I think Mr. Readwin's must have been, was at the Clogau (North Wales). There Capt. John Parry extracted some hundreds of pounds of gold by means of that pan, from exceedingly rich quartz.
4.—The machines were exactly the same in form as those shown in Mr. Readwin's plan.
5.—Their great defect was, as indicated by Mr. Readwin, that the points of

pestles were away very fast, and the mercury well at bottom of pan, with the centre projection, too, were cut up very quickly with comparatively little work.
6.—To remedy this my father in 1866, being then engineer at Clogau, made use of the worn out pestles, turning a face on the ends, and tapping thereon hardened steel points.

7.—The machines that he has recently been making he has always put these steel points in the pestles, and a corresponding one in the mercury well at the bottom of the pan, to hold the pestles obliquely.

8.—There are four of such machines at work here, and as the mine is very difficult of access it was necessary to make the pans and pestles each in two parts.

9.—When we commenced working it was found that the steel points of pestles act like boring bits, cutting up the bottom of the pan around the steel centre stud, producing finely divided iron, which got so much mixed up by the trituration with the amalgam that we could not by any means separate or clean it but by retorting and treating the residue with acid—a costly and tiresome process.

10.—Afterwards I chipped out the recess in pan so as to take a dished steel washer, which was hardened and secured in position by the steel centre stud. This alteration reduced the amount of fine iron to a great extent, but there is still a good deal produced.

11.—It will be seen from the above that all the principal of Mr. Readwin's patented improvements in the original Britten pan have been anticipated.

12.—The continuous feed arrangement, and the locking of the amalgam discharge sluice, do not appear to me to be of any service.

13.—As far as my experience goes, the Britten pans will not treat mineral if fed continuously; they will simply discharge it in the same state as received.

14.—The *modus operandi* here is to charge about 30 lbs. at a time, and let the pestle crush and triturate same for about 20 minutes, and then wash off.

15.—Of course, the more automatic a machine can be made to work the more efficient it is, and herein lies the great advantage of well constructed stamps.

16.—Mr. Readwin has not provided a cover for his pans, and it is scarcely to be expected that a man would go to the trouble of disengaging the plugs at bottom, even if not locked (as Mr. Readwin provides), when it is infinitely less trouble to throw the machine out of gear, and take the amalgam out from the top either with his hand, or scoop, or ladle.

17.—The machines could be geared so that they could not be stopped unless by an authorised person, but, after all, if the machine is not covered the amalgam can always be fished up by a properly constructed scoop.

18.—The only means of preventing theft is a properly constructed mill-house, and an organised system of search on the ingress and egress of the workmen, even to the extent of a complete change of clothes, and a bath, if found necessary.

19.—Other objections to the Britten pan are its unportability, and the small amount of work it will do.

20.—As the crushing power depends entirely on the weight of the pestle, they have very little effect if made less than 7 or 8 cwt. a piece.

21.—Now, to get a piece of this weight up here, is, if not an impossibility, a work of months, and means a cost of hundreds of pounds per ton.

22.—As it is, though the pestles are made in two parts, the machines which cost 25*l.* each in England have cost 75*l.* each to bring up here, making a total of 100*l.*

23.—Again, a Britten pan with a pestle of 7 cwt. will not, under the most favourable circumstances, crush properly more than $\frac{1}{2}$ ton of quartz in 24 hours. Thus, to crush 100 or 200 tons a day, as is the case in some of our gold mines, a considerable mechanics' department would be required to keep them in order, and the cost of 200 or 400 machines and their maintenance in working order would be enormous.

24.—At this mine, and I dare say there are scores of mines in the world as disadvantageously situated, it would cost to purchase and put up this class of machinery sufficient to treat a ton of ore at least 15,000*l.*, and stamps to do the same amount would not cost half the money.

25.—Besides, the Britten pan will only treat stuff about $\frac{1}{2}$ in. cube, while stamps will take it 1 $\frac{1}{2}$ in. or more.

26.—My idea in bringing out the few Britten pans that I have was to treat in them rich portions of mineral that it would not be advisable to put in the stamps.

27.—My object in writing is not to attempt in any way to throw cold water on Mr. Readwin's scheme, for really, if the secret process he has in his possession will do what he claims for it, it does not matter what class of machine is used, and it will prove to be a boon to all who have the cares of amalgamation to contend with.

28.—But I simply say that what Mr. Readwin claims as improvements in the Britten pan have been anticipated, and even if they had not been, they are not worth the expense of protecting by letters patent.

Having made all these forcible allegations, Mr. Green goes on to describe a plan of amalgamation that "looks creation." Continuing my numerals, that my replies may be the briefer, Mr. Green writes:—

29.—Nothing can touch well-constructed stamps of the Californian type, amalgamated copper plates below, and afterwards Hungarian pans. These will catch all the free gold.

30.—At the great Callao Mine two-thirds of the gold is obtained from a comparatively small area of copper plates, and any passing these will surely be taken up by the Hungarian pans.

31.—To follow these should be constructed a complete system of slime apparatus for concentrating the tailings and the pyrites, which, as a rule, contain the troublesome part of the work, would then be reduced into compact form for calcination and retortment.

32.—This apparatus can all be arranged so as to guard against theft, one of the points Mr. Readwin lays stress on.

My replies to the allegations are as follows:—

1.—No.—2. Certainly not.

3.—My experience of the Britten pans was 10 or 12 years before Mr. Green's. I used them myself at the Clogau Mine, and no gold of any account was got there on the discontinuance of the Britten pan. But much gold was lost at Clogau owing to the associated tellurides and bismuthides. The stamps battery erected on the then most improved principle and, I fancy by Mr. Green, has since been taken down and swept away.

4.—The machines were not of the same curvature as those I use now.

5.—The wear and tear, as Mr. Green indicates, was enormous. I have now no centre projection, and wear and tear are reduced to a minimum.

6.—I am aware of Mr. Green's father having put steel points to the pestles. I believe I did it before 1866, and it was always a bungle.

7.—My pestles differ from Mr. Green's in that I put a spindle of phosphor bronze right through them, and no point in the centre of the mercury well. The pestle point often got out of its circle I dare say, and caused some trouble.

8.—I make my pestles in two parts, not the pans. A cracked basin cannot be a sound idea. The attempt to take anything to an inaccessible place is only chimerical. The lighter the weight the less difficult to carry anywhere one would think.

9.—Effects, as a matter of course. The manager might have known of these before he started for his inaccessible place.

10.—A very good thing to do; but it would have been better to have chipped away the damaging centre point. Perhaps more had got into the mercury than "fine iron." There was a fine something else, I warrant, on analysis. I write this because I have some Organos tailings before me at this moment containing more than 100 ozs. of gold to the ton associated with (P).

11.—The reverse is the case.

12.—Mr. Green is, perhaps, short-sighted.

13.—Mr. Green's experience of the Britten pan certainly does not go so far back as mine. I bought the first that was made of the patentee himself.

14.—The *modus operandi* of charging 30 lbs. at a time, and in about 20 minutes wash off, shows that his mode of using the machine will lose much fine float-gold, if his ore contains it, and from my experiments on it, I think it does.

15.—We are at one that "the more automatic a machine can be made to work the more efficient it is." Perhaps I have never seen any well constructed stamps. I recollect once going into Cardiganshire, somewhere about the time he names, to see some novel stamps of his father's in operation, and thinking highly of them. Stamps, however, are not in the discussion. The difficulty begins where the stamps end.

16.—True, I have not provided a cover for my pans; I contemplate working low grade ores, and keeping the pans continually at work. A man would be a fool who tried to fish out amalgam when the pestle was going 35 revolutions a minute. In treating low grade ores there never would be much amalgam to fish out.

17.—Of course, the machines can and will be geared so that they could not be stopped, except by authorisation.

18.—Of course, I believe in theft as who does not? My process does not involve an exhibition of the nude of employees every shift. I arrange so that they do not touch the mercury.

19.—"Unportability" of the machine is only a mild joke. Why, their very smallness contradicts the idea flatly. To some miners this appears ghastly, as the only weak place in the process. By the Holy Gospels, this is the last objection to have expected. The small amount of work they will do is certainly a drawback. "Slow and sure," however, does not work badly in the long run. Much ado about little or nothing, perhaps, is not more than equally good with little ado about something. Slowly and surely, then, for me.

20.—The crushing power does not depend entirely on the weight of the pestle. I had a 4-ton pestle once, and I know what it did not do.

21.—Why, go into impossible places. I do not know how it is done. De la Rue, I think, has spectroscopically discovered gold in the "Moon." I do not fancy it would answer anybody's purpose to try amalgamation in the moon, although mercury seems thereabouts at times.

22.—Mr. Green's Britten cost 1*l.* each more than mine! Though so much cheaper it would not do to send even mine to impossible places.

23.—Suppose it does not, and I would not let it, crush more than $\frac{1}{2}$ ton of quartz in 24 hours. What of it! The first object of amalgamation should not, I take it, be how much can be done; but how well it can be done. A first-rate lesson can be learned in a Lancashire spinning-mill. In the use of my pans there is no such thing as enormous maintenance expenditure. It is less than any other plan that I know of.

24.—Mr. Green's arithmetic appears at fault here. Apparatus to do 50 tons a day on my plan would cost at San Francisco 2500*l.* to 3000*l.* complete. I do not know what it would cost to get it thence to his quarters, but not 12,000*l.* I should think. Is the place uninhabited except by himself? Are there no beasts of burden of any kind?

25.—What of it?

26.—Not a bad idea, but why take Britten pans if of no use for reasons (P) of your own? I thought stamps were your all in all, Mr. Green.

27.—It is not easy to guess what was Mr. Green's object in writing his letter. My scheme cannot get along without a lot of cold water being thrown upon it. I do not think I claim too much for it. I do not, however, claim to get out of pyrites unamalgamable gold. I challenge comparison with other methods. By my mode of treating mercury I get gold where I never could get it before, and I have never yet asked anybody to adopt it, or to pay a great fee for testing minerals that have come during the past year from the chief auriferous regions of the globe.

28.—Mr. Green's simple saying that what Mr. Readwin claims as improvements in the Britten pan have been anticipated is a false fact. The rest is matter of opinion, of no cost whatever to Mr. Green, but of considerable cost to me.

29.—This is merely assertion. It cannot be fact.

30.—The assertion that anything passing the copper plates will be surely taken up by Hungarian pans cannot be fact. Why does gold pass the copper plates?

31.—This climax shows that the "tailings" require retreatment, which makes me think that Mr. Green had better not have written his letter.

At a meeting of the Broadway Gold Mining Company, the Chairman is reported to have regretted that the treatment of the lode-stuff by the Readwin process had been unsatisfactory. This public announcement I think, should, in common courtesy, have been accompanied by explanations. Allow me to say that 10 days ago I received a letter from the man I entrusted with my prepared mercury to go out and test Mr. Butler-Johnstone's minerals on the spot, in which he informs me of having operated on three lots of stuff selected by the manager.

The first lot, 4500 lbs., gave him 14 dwts. of gold and silver.
The second lot, 3500 lbs., gave 9 $\frac{1}{2}$ dwts. of gold and silver.
The third lot, 250 lbs., gave him at the rate of 16 dwts. of ditto to the ton of ore, "which," he says, "is more than they ever got out before, as far as I can find out." He says, also, that some of the poorest ores were given him to treat.

If these are really facts, certainly the mineowners, whoever they may happen to be, need not be at all uneasy about their property, whether my process be the best suited for this class of ore or not.

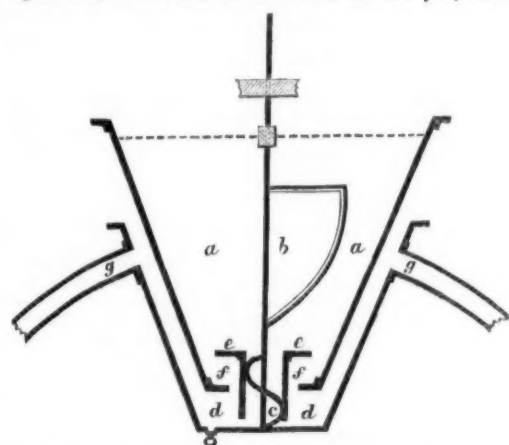
If, on the other hand, unwarrantable expectations have been fondled and cherished, as to the actual value of the ores, it is scarcely fair to my simple method of amalgamation, to pronounce off-hand of it by comparison of facts *in case*, with others as yet only *in posse*.

At the outset Mr. Butler-Johnstone told me that the ore generally contained a good deal of float gold; Roberts (the man sent out) says this is so, and that it is more like mica. A lot of it was sent out to Pestarena (I think) for treatment without satisfactory results. Mr. Butler-Johnstone gave me about 8 lbs. of what remained of that lot, and I treated it by my process at East Greenwich, and it yielded at the rate of 8 dwts. 22 $\frac{1}{2}$ grs. of pale electrum to the ton of ore. From this limited personal knowledge of the ore, taken in connection with what appears reliable testimony, I do not hesitate to say that my process should get out not only 80 per cent. of the contained gold, but practically the whole of it.

London, Jan. 3. T. A. READWIN, F.G.S.

GOLD AMALGAMATION.

SIR,—Without wishing to enter into the controversy as to whether Mr. Readwin's patent for grinding and amalgamating is a novelty or not, I am able to testify from experience to the correctness of Mr. James G. Green's statement in his letter to the Journal of Saturday last—that "the Britten pan will not treat mineral if fed continuously." Some time since I designed for an Austrian friend a couple of small amalgamators, section sketch of which I forward you, and I am



pleased to hear the idea is approved of. The crushed material and water, after passing through the screens of the stamps, flows into the chamber, *a*, *a*; through the centre of this a vertical shaft is made to revolve, and upon which is fitted the stirrer, *b*, and upon the lower end of which is a spiral worm, which revolving causes the mercury in the chamber *d*, *d*, to rise and flow over the ledges, *e*, *e*, *f*, *f*, thus ensuring that the mercury is brought thoroughly in contact with the crushed material, which afterwards flows away through the pipes, *g*, *g*. Should any of your readers wish for further particulars, I shall be pleased to afford, through the Journal, all information in my power.
Penwortham, Jan. 1. F. KENSINGTON.

THE NEWPORT ABERCARN BLACK VEIN STEAM COAL COMPANY.

SIR,—Some misconception has arisen as to the dividend recently paid by the above company. The distribution at the rate of 6 per cent. was an interim one, the final adjustment of accounts for the year being after the end of next March. A larger interim distribution could not have been made, having regard to the preference shares. The current profits are, however, amply sufficient to pay more than 10 per cent. dividend.
H.

MINING IN NORTH CARDIGANSHIRE.

SIR,—I am glad to see by last week's Journal that the Brynarian Mine has been taken up by a new company; this property has yielded good returns formerly, and if the money subscribed is spent in completing the work commenced there, but left unfinished by former workers, I think it will be a success.
Jan. 10. VIATOR.

TIN MINES, AND SMELTERS' PROFITS.

SIR,—As there seems to be several contradictory statements regarding the returning charges, profits, &c., on smelting tin ores, with your permission I beg to offer the following remarks, which may help to explain some of them:—Before the tin coinages were abolished all tin ores were denominated black tin, and the metal obtained from the ores white tin. When the black tin was taken to the smelting works it was weighed in a scale, which with the weights were inspected and adjusted at least once a quarter by the Duchy officers. The $\frac{1}{2}$ cwt. then in use weighed 57 $\frac{1}{2}$ lbs., two weighing 115 lbs., the smelters' hundredweight. When the coinages were abolished the Duchy officers were superannuated, and about the same time a law was passed that the hundredweight should not exceed 112 lbs., and the old 57 $\frac{1}{2}$ lbs. weights were declared illegal, and replaced by 56 lbs. The smelters then adopted the present system of deducting 3 lbs. per hundredweight on the black tin, being an equivalent for the difference. After the ores were weighed and taken to the tin hut a sample was taken and assayed in precisely the same manner as at the present time, and a reserve taken off the produce (1 $\frac{1}{2}$ would be deducted if the metal was of average quality); from the baser metals greater reserves were taken, and a tin bill was given for the net weight to be delivered at the Coinage Hall. Sometimes the smelter bought the tin bills, and usually gave another in exchange when he was the purchaser.

Many folks remember the story of the Wendron streamer, who, on returning from the smelting works at the time of a rising market, said he had a tin bill, 20 for 30, and it was still rising when he left, and when asked for an explanation said that he had 13 (produce) for his crop tin, and 7 (produce) for his roughs. In this case it is very evident that the smelter was the purchaser. The tin ores from the different mines were mixed together in a large hutch for smelting that there might be as little loss as possible. In 1703 or thereabouts Messrs. Moul and Tiddell obtained a patent for reverberatory furnaces. These were adopted by the tin smelters, being considered more effective than the blast furnaces. By the mode of assaying and smelting there is a loss which varies according to the quality of the mixture. The loss on smelting black tin and refining white tin may safely be estimated at three-eighths, leaving seven-eighths for the smelter. If the mixture contained a large quantity of hard or base metal the loss might be greater. The black tin at the present time

is smelted in reverberatory furnaces much larger than those used formerly—about three times the quantity every six hours without any additional employees. It is very evident that in the coinage days the tin smelters derived their returning charges and profits out of the 14 reserve, and the 60 lbs. per ton of black tin extra on the ton, and the purchase of tin bills was a separate speculation of profit and loss.

STANNUM.

BIRMINGHAM AND HARROWBARROW MINING COMPANY.

SIR,—Will you allow me to reply to several correspondents in relation to the advertisement of this company which appears in last week's Journal and this? My answers will indicate the questions which have been asked.

1. The leases are held under the Duchy of Cornwall and Miss Olympia Bennett, and have about 10 years unexpired.

2. The remuneration of the directors will be fixed by the shareholders, and will entirely be paid out of profits.

3. If the demand for our shares does not far exceed the supply before the 23rd instant, it will be traceable to the same cause as that which prevented some one, as the story goes, from selling a given number of genuine sovereigns on London Bridge at one penny each.

I quite sympathise with the investing public in its desire to act cautiously in selecting mines, for of late years some hundreds of thousands have vanished through bubble companies which have been started. All the promoters of this company ask from the public is a strict enquiry as to the facts brought out in our prospectus.

G. S. DOWLING, Managing Director.

Temple-street, Birmingham, Jan. 11.

SILVER HILL COMPANY, AND THE SILVER ZONE.

SIR,—I have just read the very interesting account of the Silver Zone district in last week's Journal with reference to the late Wheal Fortune Company, now re-started again under a new concern. So far as I can judge the new start would seem to have a fair prospect of success, but many companies have commenced with as fair prospects, especially when I think of the high eulogiums passed by the Press, and the great certificates given by certain knowing worthies regarding the prospects of Silver Hill, and its being so favourably placed in that veritable Silver Zone now so lauded. Surely if any company should do wonders and create not a little astonishment, according to sound mining engineer's reports, it should have been Silver Hill. The able and exhaustive report issued by our directors in April, 1881, of Mr. Geo. Henwood's survey speak volumes as to the great value of the sett, not to speak of the other gentlemen who know the district well, and testified accordingly; but the result so far has but created not a little disappointment, for after eight years' heavy and fast work the company would seem to be at its wits end to come on the Silver Zone or give a glimmer of realisation of the hopes and certainties expressed in the prospectus. Possibly some shareholders like myself are of the idea that it would almost seem as if the property was being only tunneled for the landlord's benefit and not the shareholders, because the company have cut certain valuable lodes which might be wrought upon, and yet the system is pursued of tunneling to the end of the sett, with no great results so far, with which many holders are pretty well sick of. I notice a Chairman at a late meeting of one of the Indian concerns gave it out that most or many home mines took from two to six years before being any good. This is rather a damper indeed, and certainly I would not like such a gloomy look out as regards Silver Hill. I though believe skill, knowledge, and energetic management has been brought to bear on the work, but as yet the results are disappointing, and I presume a little more patience will have to be exercised until we get the good luck which is supposed to govern mining ventures, but which I trust goes hand in hand with science, knowledge, and experience, or else we are lost. I hope there will be a half-yearly meeting soon, when we may get a ray of light from the directorate on our fears, &c.

SCEPTIC.

MINING INSTITUTE OF CORNWALL—TREVITHICK'S INVENTIONS.

SIR,—In a letter by "X," in last week's Journal, he refers to a statement in which I was reported to have said that the kibble and plunger pump were inventions of Trevithick. With reference to the kibble, what I did say was that Trevithick invented the wrought kibble with the ingenious contrivance for landing and tipping the same, which has never been surpassed up to the present time. The word invention applied to the combination. Before Trevithick's time wood kiddles, hooped with iron, were used in Cornish mines.

With reference to the plunger pump, the following is a quotation from a paper read by me at a meeting of the Mining Institute of Cornwall, and published:—"The most important pump employed in our mines is the plunger, invented by Sir Samuel Morland about the year 1680. The plunger pump is also generally adopted for pumping sewage; it works with much less wear and tear than the piston or jack head pump, because gravel and other impurities in the water do not come in contact with the packing, and so damage the pole, whereas with a piston sliding in a working barrel the whole pump is rapidly destroyed, provided the water is gritty and foul."

What I did claim for Trevithick was the general introduction of the plunger pump into our mines, also the shifting stuffing-box and the construction of the pole and case in such a manner as to give a clearance all round the pole, the latter modification being of vital importance. I claimed nothing more under this head. I quite agree with "X" that it is not necessary to gild refined gold. Trevithick did enough to render himself famous; and his name is one among the very few that will be handed down to posterity in general history. Let us all unite in the effort now being made to raise a memorial to his memory.—Hayle, Jan. 10.

WM. HUSBAND.

THE CALLINGTON DISTRICT, AND ITS MINES.

SIR,—I hope with the new year we are going to see a little more activity and a better future in many mines in the district. Late Wheal Fortune, alias Wheal Newton, alias Queen Mine, alias Old Harrowbarrow Mine is now to be resumed under the name of the Birmingham and Harrowbarrow Mining Company, with a sufficient capital to have a fair start. I have not the least doubt but by this time next year the shareholders will have had all of their subscribed capital returned in dividends, as is a well-known fact that when it worked under the name of Wheal Newton that they sold over 10,000L. worth of silver, which was raised in a few months, and between this property and the Wheal Brothers Silver Mine there are hundreds of thousands of pounds worth of silver ore yet to be discovered—in addition to the silver lodes there is a copper lode. I very well recollect when it worked for copper only, arsenical mundic at that time being useless. Many times within the last 12 months in passing through Harrowbarrow village I have been on their floors and seen their arsenical and copper mundics, and better quality is not to be seen in the district anywhere; another great advantage is they are within 3 furlongs of the arsenic works at Coombe, where they are able to get the best possible price for all they can get of that class produce; the silver, of course, finds another market.

Another mine where we may reasonably expect to see an early dividend is the Trebartha Larnar, one of the most promising young tin mines in the county. Although I say young, it worked 250 years ago by a squatter as deep as manual labour would admit just in one portion of the sett only. Mr. Trebartha, the squatter referred to, in a small way of working made so much money from the returns of his tin that he bought 8000 acres of land and built a mansion, and named it Trebartha Hall, the name it still retains. From that time until very recently there has been no attempt to raise any tin. Since operations commenced the company have opened up two levels, one over the other, and communicated them by a rise, and proved their lode preparatory to erecting any machinery. They find the lode large and well defined, with a large quantity of arsenical mundic. I have seen samples broken from the lode that made by assay over 13 cwt. of black tin to the ton of stuff. The lode proves to be rich both in tin and arsenic. In addition to their having a splendid lode, they have a river of water above them that is brought

on the mine in sufficient quantities to work their pumping-engine, drawing-engine, with capstan, and for as many heads of stamps as they may require at all seasons of the year, and water brought on and leats made to take it away and paid for; stamps bought, and one wheel erected, with over 200 tons of the lode at surface broke at the size fit for the stamps. I advise all intending purchasers to buy at once, as there must be a great rise in price ere long.

Callington.

JNO. BUCKINGHAM.

FICTITIOUS MINING ACCOUNTS.

SIR,—In the Journal of Dec. 23 I read a letter treating very reasonably on the fallacy of crediting ores unsold, in many cases undressed, and in some cases even unbroken, in the accounts of a mining company. Acknowledging this extremely fallacious way of representing the financial position of a company, there is yet another which I consider equally as deceiving, and which, in justice to the initiate in mining, ought to be laid bare, and with that previously mentioned, and so ably particularised by your correspondent, be well looked into and understood by them, who, as a rule, know little or nothing of mining in general, and are easily wrongly impressed as to the security of their investment. I have had pointed out to me on more than one occasion instances of this kind, where dividends have been paid out of the returns, whilst the working expenses of the mine have been partially, and in great measure, paid out of the original capital of the company. It happens as follows:—"All works of development, such as driving, rising, and sinking on the course of the lode, are paid for out of a separate fund, set apart out of the capital for the purpose, and the raising of ore, with its simple cost of treating only, paid for out of the ore-money, which consequently leaves a margin of profit. It looks bright enough to see a mine enter the Dividend List; but how surprising and deceiving to the public to have it, so soon after paying one such dividend, insolvent and in liquidation. I quite approve and highly recommend the keeping of a separate account for exploratory works, which are distinct, and in the main speculative. But I consider all works essentially and immediately in connection with the raising of ores ought to be charged in the current account of a company."

YSTWYTH.

WHEAL FORTUNE—THE OLD QUEEN.

SIR,—Doubleless many of your readers in the Callington district will be glad to know that the Old Queen Mine, lately known as Wheal Fortune, is really again going to work. Having always heard of this as a thoroughly good mine it is a pity that lack of capital should have kept it so long in such a hand-to-mouth condition. I see, however, by the prospectus, that some of the best of the old adventurers are rallying round it. This would appear to show that those who know most have the greatest confidence, and I heartily wish them success.—Callington, Jan. 4.

A NEIGHBOUR.

MINE RATING.

SIR,—In the reports which appear in to-day's papers, of the appeals of the South-Western Railway Company against the rating of their line in several Devonshire parishes, I observe it stated that "the Court decided to recognise the principle set up by the railway that some miles of their land were of no rateable value, because traffic in certain parishes did not cover the working expenses." There can be no doubt that this decision is in accord with common sense, and that in the case of mines not only rates, but royalties should be entirely dependent on profits. The latter boon is one, however, that is only likely to be secured when the owners of mineral rights realise the fact—patent to all others interested in mining—that their present short-sighted policy is killing the goose that lays the golden egg for them, and that thousands—nay millions—of capital are now being sent abroad, which more liberal treatment would retain for the development of our languishing home industry.

The rating question seems more promising, and there appears a fair prospect of all events obtaining a rescission of the unjust rule recently adopted of assessing mines on the underground value—taking the dues as a basis for calculation—in addition to the surface value. Could not a fund be raised by subscription from the various mining companies to take a test case before the Courts? If all that is necessary to obtain a favourable decision is—as in the railway case quoted—proof of inability to cover working expenses, I fear there are only too many mining companies who would present an unassailable case. Pray, sir, lend us your valuable aid to obtain some relief for the mining industry now so sorely tried, and thus lighten the load which the present bad times cause anxious directors, discontented shareholders, and clamorous creditors to unite in laying on the shoulders of

A MINING SECRETARY.

CORNISH MINING—ITS MINERAL RESOURCES, AND UNWROUGHT GROUND.

SIR,—No enterprise pays like a rich mine, and that the county still abounds in wealth of copper and tin may be inferred from the fact of the success attending the development of some few mines adjacent to and surrounded by the most productive mines of Cornwall. Of late attention has been given to this class of mining, and it has been found less expensive and risky, and when compared to some large schemes introduced for the resuscitation of old worn-out deep mines, success has attended their researches with an outlay of less than one-quarter part charged for promoting such schemes alone. In the midst of the districts of Gwennap, Redruth, Illogan, and Camborne (the greatest mineral producing districts of the county) are the granite hills of Carn Marth and Carn Brea, forced up by volcanic power, and forming veins in which are found most abundantly metallic deposits. It is around such upheaves that by far the largest portion of the mineral wealth of Cornwall occurs, at the foot of which may be seen cropping out at surface elvans of highly crystalline character in close connection with mineral veins, showing evidences of rich deposits being found at a shallow depth. It was those evidences which the last generation took for their guide and realised such astounding profits as have gained for them a world-wide celebrity, and to which practically scientific mining authorities will ever attach great importance, having proved to be the safest guide in forming their opinions of the inherent value of mining properties. I have long strongly advocated the like of such properties, the county possessing many, requiring a comparatively small capital to open up very valuable ground. There are some mines in the Redruth and Camborne districts carried on in a very unostentatious way, owned chiefly by Cornish people (who, by-the-by, generally manage to have the best mines), necessarily worked inexpensively from their being so shallow, indeed may be designated as "just getting below the outcrop" in settled ground, their present returns nearly paying the working cost in addition to surface erections and appliances for dressing the ores, the return of which the most eminent authorities pronounce has never been known to fail on deeper development; such properties not being subject to the unaccountable fluctuations looked upon as one of the enigmas in mining valuation of which the mysteries of share jobbers can alone give a solution. Although they are quoted now at a mere nominal price their progress for the last six months indicates a high prospective value and will, I predict, rank among the coming prizes of 1883.

CHAS. BAWDEN.

St. Day, Scorrier, Cornwall, Jan. 11.

THE BASIC STEEL PROCESS.—Favourable progress continues to be made in practice with the Thomas-Gilchrist dephosphorizing process as evinced by the recent returns of the output at the various European works using the process. The total number of these works using or about to start using the process is at present 32. Of these, there are 14 in Germany, 6 in France, 4 in England, 4 in Austria, 2 in Belgium, 1 in Luxemburg, and 1 in Russia. Besides these, there are 13 works the proprietors of which have taken licences to use the process and where it will probably be adopted in course of a short time. Of these, there are 9 in England, 3 in France, and 1 in Belgium. The total quantity of basic steel manufactured at the works where the process is in operation in the above countries during the month of October last was not less than 46,537 tons by 15 firms. The German

makers stand first with an aggregate output of 25,170 tons by 8 firms, or an average of 3146 tons each. In England however, the output was 9500 tons by only one firm. Austria shows an output of 7700 tons by three firms; Belgium 1687 tons by one firm; Russia 1270 tons by one firm; and France 1240 by one firm. This output, and the extent to which the process is being worked, would appear to indicate that, although barely out of its infancy, it is paying. It is only reasonable to expect that with further practice and an increased output the present cost of production will be reduced, as is anticipated.

MINING INSTITUTE OF CORNWALL.

The members of this rising young institution may fairly be congratulated upon the great prosperity it has attained in so short a period from its foundation, and it must be particularly gratifying to them to know that this prosperity is chiefly due to the sound judgment which has been exercised by the executive, and to the really valuable practical papers which have been brought forward and discussed at the periodical meetings. Nor does this satisfactory progress seem likely to stop, for whether the references made by the several speakers at the recent annual assembly to the retrospect or to the prospect be considered they are equally encouraging. The report of the council stated that 15 new members had been elected during the year, and 13 names had been removed from the list. The members now numbered 138, including two life members. Having referred with satisfaction to the recent Exhibition, the report stated that, owing in great part to the exertions of Mr. Husband, arrangements had been made for the use of a room by the Institute in the new Science and Art School building at Camborne. The death of Mr. John Hocking was mentioned with regret, and the services of the retiring President were warmly eulogised. Mr. Henderson, of Truro, was nominated as President, Messrs. Husband and Frecheville as Vice-Presidents, and Messrs. R. H. Williams, T. Pryor, and Bishop as members of the council. The meeting was well attended, Messrs. J. Henderson, R. J. Frecheville, W. Teague, Josiah Thomas, C. Thomas, W. C. Vivian, W. Rich, W. T. White, F. Harvey, G. Pearce, Wickett, Bishop, Bradhurst, N. West, and W. Rich, jun., secretary, being among those present, the energy and good feeling displayed by all being the best possible augury for success.

The selection of the Cornish bishop for the new occupant of the archiepiscopal see naturally gave much satisfaction, the President, in proposing "The Bishop and Clergy, and Ministers of all Denominations," remarking that he believed the Bishop of Truro to be an excellent, straightforward, honest, honourable, upright prelate, and that he was considered so generally throughout England they had only to refer to the papers of the last few days of all ranks, grades, and politics to be assured of it. By Dr. Benson's elevation a great honour was paid to Truro, and the light of that honour was reflected on the county generally, a sentiment that was heartily endorsed by all present. But perhaps the most interesting portion of the proceedings was that connected with the toast of the evening. Mr. Henderson, in replying to the toast of "Success to the Mining Institute of Cornwall," proposed by Mr. Frecheville, delivered an able address. After expressing his gratitude for the honour conferred upon him, he said that, having been selected as their President, failure should not arise from any want of attention to the duties of the office. He congratulated the members upon the steady and marked progress of the society, and added that the recent Exhibition at Camborne had given them ample proof of the estimation in which the Institute was held by the public generally, and Cornishmen in particular.

Referring to the exhibits, he spoke particularly of the model of a telescopic windbore, exhibited by Messrs. W. and J. C. Tyack, of Camborne. It consisted, he said, of two cylinders, of sheet-iron of Camborne, thus lightly to enable them to be readily handled, one of which, supposed to represent the bottom pump containing the windbore, was made to slide within the other, through an indiarubber ring. The object of that arrangement was to enable the windbore to be drawn up into the lift above when required, so that whilst sinking the shaft, and blasting for that purpose, the windbore might be temporarily removed out of harm's way, and again quickly replaced in the bottom of the shaft, at probably an increased depth, as the result of the blast. Attempts had been made with more or less success by means of large indiarubber hose and windbores, which could be turned out of the direct line of the lifts, to obviate the necessity for continually lowering the huge suspended column or pumps, when a fresh sink was being made; but it appeared to him that the suggestion thrown out by Messrs. Tyack was a preferable one, and if taken up by practical men would in the end be the means of overcoming much of the difficulty experienced in sinking shafts, especially by the boring machines. This was the development which the Institute professed to foster and encourage.

Referring to the use of cages in metalliferous mines the President continued that the admirable model exhibited by Capt. Bishop of the cage used at East Pool Mine would seem to leave nothing further to be desired in the way of convenience, and yet he (the speaker) believed one thing was lacking—a safety catch attachment in the event of a breakage of the rope when in use. It seemed to him highly desirable to adopt a safety catch, which it should be the duty of the lander or similar person to see was in good working order at least once in 24 hours. There could be no question as to the advantage of sending down men to their work and bringing them up by machinery, but it behove mine managers to see that the conveyances were thoroughly safe and secure. He knew of no more appropriate subject to merit a high premium at the hands of the council than a working model of a cage capable of holding eight or ten men, with a safety cage attached—in fact, he suggested a special money prize in that direction. Underground surveying was a subject deserving much attention, and efforts were being made to establish a course of instruction whereby the students at the Royal School of Mines would acquire a practical as well as a theoretical knowledge of this important part of the profession of a mining engineer. The repeated occurrence of rich lodes running in close proximity to a boundary rendered their survey to the very inch necessary, but as that involved also the strictest accuracy in the survey of the surface boundaries, the mere reading and registering of an ordinary dial's bearings were not all that was required. The mine surveyor had to contend with difficulties unknown to his confrère, the land surveyor, and had, in consequence, far more to learn before he could be termed a master of his profession. With all its attendant difficulties, and even dangers, there was some fascination in the employment, and, even at his time of life, he enjoyed a complicated survey with as much zest as when, many years ago, he came amongst them and first pursued this interesting part of his profession of a civil engineer. He observed that inasmuch as electric lighting was still in its infancy it might be inferred that it would be developed steadily and surely, and that the general application of electricity to mining purposes, either as an economical means of producing light or as a conveying power, was not very far in the dim future. He referred in eulogistic terms to a system of electric signalling which had already been introduced in the leading coal mines of England, and was highly approved of. Messrs. Walker and Oliver, of Cardiff, exhibited at Camborne that signalling in operation, and were awarded a silver medal for that and their other exhibits, and deservedly so, as it had met a want long felt in their mines.

With regard to the future of the Institute, and the work to be accomplished by it, many of the observations made were particularly worthy of attention. The President paid a well-merited compliment to his predecessor in the chair, observing that Mr. Husband said in his concluding remarks that he almost envied him his position as President for the coming year, as he anticipated several events of interest to the Institute would occur within the next twelve months. He was sure he only echoed their own sentiments when he said he wished he had known what was thus passing in his mind before his retirement from the presidential chair, as renewed and possibly successful efforts would have been made by the Council to retain him there. He, doubtless, referred, when making that observation, to their taking possession of their new rooms at the School of Science and Art at Camborne, the foundation-stone of which he laid with so much becoming dignity. He told them, in an almost poetic vein, that although the stone was laid amidst the gloom of winter

the building would be finished in the sunshine of summer, and he (the President) heartily wished he had remained their President to welcome them to their new home. When they had a "local habitation" besides a "name," they will feel more firmly established than ever, and probably not be so desirous as they may now be of uniting with other public institutions of the county, and forming with them one grand "tree of knowledge" with its numerous branches, of which "mining" would, no doubt, be the principal one. He believed, notwithstanding, that they would benefit by such a partnership, and he still hoped that their council would see their way to recommend an amalgamation such as had been suggested.

With respect to the proposed Trevithick Memorial, which has been so much and so favourably discussed, he could not help thinking that such should assume a practical and useful form rather than that of a mere monument to his memory, in the shape which would perhaps naturally occur to one's mind, of a statue of stone or bronze. He would rather see a building, or even a portion of a building, erected for the purpose under the auspices, say, of the amalgamated societies previously suggested, to be devoted to "mining," in which single word is included all that appertains of science and art, employed for the development of that important interest which Richard Trevithick in his associations must have known so well. Capt. J. Thomas, in responding to the toast—Success to Mining—remarked that he regarded mining as being heavily weighted. Certainly the lords were receiving quite sufficient compared with what the adventurers received; and he complained that the rates were not divided between the lords and the shareholders, as contemplated by Act of Parliament.

Capt. Teague observed that he regarded mining as the great staple industry of Cornwall, and the Institute was calculated to further its interests. He believed that between 50,000*l.* and 60,000*l.* were paid monthly in miners' wages in the mines from the Tamar to the Land's End. How many farms paid wages in the same ratio? Capt. Rich said that what was raised in the mines and what was paid in dues and wages should be kept before the public. The lords, he considered, were exceedingly shortsighted in not coming forward to strengthen the position of those who were engaged in the industry. It was also a matter for regret that the Members of Parliament did not identify themselves more than they did with the Institute, as they (the miners) had many grievances which should be known to them. The meeting, which was one of the most satisfactory which the Institute has held, was shortly afterwards brought to a close.

UTILISATION OF MINERAL AND METALLURGICAL WASTE.

The utilisation of waste has for many years past been a favourite subject with Mr. P. L. SIMMONDS, and is certainly of paramount importance to the whole community; and the interesting paper which he read at the last meeting of the Society of Arts, detailing a quarter of a century's progress, shows that his efforts in directing attention to the subject have been productive of excellent results, and that he is as active as ever in the matter. After referring very fully to the utilisation of mineral and of vegetable waste, he deals with the question of mineral waste, and in this there is much that will offer useful suggestions to readers of the *Mining Journal*. Beginning with the utilising of tin-plate cuttings and the recovery of the tin, he truly remarks that it has become an important and profitable industry. The make of tin-plates in the United Kingdom amounts to about 2,500,000 boxes of 1 cwt. or more each, of which half are exported. The vast heaps of scrap-tin found about tin-ware works, and the quantities of refuse tin cans that form such an item of City waste, have long been made the subject of experiment, to separate the tin coating from the sheet-iron. It is not my object here to go into the mechanical and chemical processes employed in various industries to recover and utilise waste; I simply desire to point out the results which have been attained. In the manufacture of tin ware it is said 5 per cent. of the whole of the plates employed disappears in the form of scrap. Birmingham produces 30 tons per week. Mr. Beck, of that town, is said to have made a profit for many years of 100*l.* a week by taking off the tin from the scrap by solution and precipitation. A very fair trade is done by parties who go about the tin-works buying up the tin dust. They even go to France and other countries, and ship it to England to be reduced. This so-called tin dust is really the scum of the tin pot, and, as it is mixed with grease, it is black. It contains a considerable quantity of metal, which is reduced by ignition and flux.

It has been stated that the waste of tinned iron used for all kinds of purposes, but especially for saucepans, kettles, button-making, &c., was formerly large, but a method is now employed by which the tin can be recovered from the waste, simply by the action of dilute sulphuric acid. Tin, to the extent of from 5 to 15 per cent., and worth about 97*l.* per ton, with a large amount of sulphate of iron, is thus procured, giving a large profit on the operation. The quantity of boxes required for preserving fish, meat, fruit, vegetables, and other food articles, is enormous. Australia, France, and South America use a great many; the Dominion of Canada and the United States still larger quantities; Nova Scotia and New Brunswick require annually five million pound boxes for preserving lobsters; British Columbia twenty million for salmon; Baltimore consumes forty-five million, which are nearly all for fruit and vegetables; Portland ten million. As tin is an expensive metal, any recovery of it from tin parings and scrap iron is of importance.

The formerly neglected mineral pyrites is next treated of. Mr. Simmonds pointing out how largely it has been turned to useful purposes to supply our manufacturers with the important material—sulphur. Our imports of cupreous iron pyrites (chiefly from Spain and Portugal) now exceeds 540,000 tons annually, and this furnishes, on an average, 130,000 tons of sulphur. The value of the sulphuric acid made in Great Britain is stated to exceed 5,000,000*l.* In the United States about 50,000 tons of pyrites are also used; in Germany, 74,000 tons; and it is now also utilised in other countries. Instead of throwing away the roasted pyrites, as was formerly the case, when the sulphuric acid maker has extracted the most of the sulphur, he hands over the burnt ore to the copper extractor, who not only separates the copper it contains, but at the same time so perfectly removes the sulphur that the residue, consisting chiefly of peroxide of iron, is suitable for, and is now largely used in various iron-making processes. Besides this, the pyrites in its original condition contains from $\frac{1}{2}$ to 1 oz. of silver per ton; and chemical processes have been devised by which this small quantity can be separated at a profit; for at one of the works on the Tyne more than 16,000 ozs. of silver are extracted annually.

After mentioning that in wire-making factories the dilute sulphuric acid, formerly used to clean the wire, was run to waste, but is now utilised in the production of copperas, and that the waste of this waste is metamorphosed into a pigment equal to imported Venetian red, Mr. Simmonds continues that it is not only in the inferior metals that waste is now prevented, for increased attention is given to the collection of gold formerly lost. Immense heaps of refuse, or tailings, as they are technically termed, accumulate where mining operations are carried on. The sludge which is emptied from the puddling mills in Australia contains a considerable quantity of fine gold. Much of this is now recovered, and the yield of gold from these exceeds 3 dwts. per ton. The right to wash these tailings is often sold to the Chinese, who are always well satisfied with the result of their labours.

Turning to the waste from coal and iron it was remarked that in May, 1879, Mr. Perkin estimated the value of the coal tar colours then manufactured in Europe at over 3,000,000*l.* sterling, and this is an industry which only dates from 1856. Although no method for the utilisation of wood tar if likely to prove of as much practical importance as the discoveries in coal tar, on account of the limited quantity of wood tar produced, experiments have of late years been conducted with this view, and several new compounds have been produced; but experiments on a large scale are necessary to determine their practical value. Scattered throughout the iron making districts of Great Britain are many millions tons of scoria or refuse from the blast-furnaces, which is technically known as "slag." This slag goes on accumulating at the rate of nearly eight millions of tons per annum, its bulk being some three times that of the iron from which it has been separated. It forms a heavy encumbrance to ironmasters, demanding the purchase of large

tracts of land whereupon to deposit it, the investment being, of course, wholly unremunerative. There are one or two exceptions to this rule, where the slag is tipped into the sea, and serves to form land for the works, and where some of the ironworks supply slag for the construction of breakwater and training walls. The quantity thus utilised, however, on the Tees is but about 600,000 tons per annum, forming only a small proportion of the whole yield of the district. In early times slag was broken up by hand, and used for road-making, and it so continues to be used, where it can be had without a heavy cost for transport, but there is only a limited demand for this purpose. On the Continent, where stone is scarce, slag plays a prominent part in road-making, as in Silesia and other similarly situated districts. Another direction in which many attempts have been made to utilise slag, both at home and abroad, is to adapt it for constructive purposes, and various schemes have been devised for transforming the highly refractory slag into bricks, sand, and other materials for building. It is also applied to the manufacture of artificial stone, and moulded into chimney pieces, window-heads, balustrading, and outside ornamental builders' work generally. The stone is composed of pulverised slag, $\frac{2}{3}$ parts; ground brick, $\frac{1}{3}$ parts; portland cement, 1 part. The mixture is run into moulds, and sets quickly, the articles being ready for the market in four or five days. Another useful purpose for which it has been successfully utilised is that of glass manufacture. The vitreous character of slag indicates a resemblance to glass in its composition. It does, in fact, contain the principal components of glass, but not in proper proportions, and those in which it is deficient have, therefore, to be added, with others which are not present. Another application is the manufacture of slag-wool. By the action of strong jets of steam the slag is transformed into a fibrous whitish silicate cotton, which, being metallic, is incombustible, like asbestos. In the construction of new houses with mansard roofs, the space between the interior lath, or panelling, and the exterior covering of zinc, slate, or tin is filled with this slag-wool, which protects from the rigour of frost in winter and the intense heat in summer. If in winter the taps, and spouts, and water-pipes are covered with this slag-wool it prevents the freezing of the water and the bursting of the pipes and joints. This slag-wool is also used now by gardeners to cover plants, and protect them from the effects of sudden changes of temperature. In view of the general usefulness of slag when converted into the various articles described, it is to be hoped, in the interests of commerce and progress, that the practice of its utilisation may become more and more extended. Doubtless, human progress will show that what is now the veriest waste will in the course of time assume a condition of value. Thus will art be made to approximate to nature in that it will know no waste.

There are one or two other mineral substances formerly neglected, which have of late years been applied to very extensive important uses. One of these is asbestos. This was long considered a mere curiosity for making small fireproof articles. It is the only flexible fibrous mineral substance that is perfectly indestructible by fire or acids, notwithstanding it consists of fibres as fine as the finest linen. Now it is scarcely possible to enumerate all the uses to which it is applied. Among others are, as a roofing material, cement, paint, fireproof coating for inside of factories, theatres, &c., in danger of ignition, felt for steam-pipes, boilers, lining for floors, roofs, &c. A prominent and peculiar feature in the landscape of the coal mining regions is the enormous heaps of black and apparently useless material collected near the outlet of each mine. As the quantity of small waste coal in the United Kingdom has been estimated at 28,000,000 tons per annum, the utilisation of this refuse is a matter of national importance in more senses than one. It is now, in many districts, consolidated into blocks, and besides what is used at home 412,310 tons of this patent manufactured fuel was exported last year. In several foreign countries the pitch from coal tar is combined with coal dust, and pressed into the form of bricks, and an excellent fuel is thus produced, which, it is said, will generate a greater amount of heat than can be obtained from the same quantity of any other combustible material employed for utility or comfort, while, at the same time, it can be stored more compactly and in better shape than either wood or coal. Some 40,000,000 tons of valueless coal dust lying in the vicinity of the coal mines and depots of Pennsylvania have been thus gradually utilised. In some American factories they have found it cheaper and more advantageous to burn only coal dust or pea coal. A furnace or grate bar has been specially devised for the purpose of burning this kind of fuel, and there is no doubt with its increasing but that other convenient devices will be supplied for making it of more practical benefit. The utilisation of this waste in the coal regions of the United States is now a decided success. Anything tending to the utilisation of what is now waste is of value, when we consider that the amount of anthracite coal sent to market represents but about four-fifths of the quantity that is actually raised from the earth, the balance being piled up in unsightly heaps. Thus science has taught us how to transmute the waste and refuse materials—elements of pollution—into sources of economy and wealth.

An interesting discussion followed the reading of the paper, and at the conclusion the Chairman—Mr. Hyde Clarke—said it had been a great gratification to him to hear this paper, for he had not only known Mr. Simmonds for many years, but had also witnessed his exertions in this very important field. It was needless to speak of the value of these labours, because they had been attested by gentlemen from various parts of the world, but there was a great practical lesson to be learned from it. Many years ago, in connection with other important pursuits in which he was engaged in the promotion of industrial economics, Mr. Simmonds took up this subject, and if others would follow his example great benefit would result. People were often deceived about the progress of science in any particular branch. They saw men of the greatest distinction applying themselves to it, and fancied the whole field was occupied. If anyone would in the humblest way do as Mr. Simmonds had done—take up one subject, and apply himself to it—he would do more good to the world than by simply following in the wake of some great man, reading books, and doing nothing but accept his ideas. This subject of waste products had very largely occupied the attention of the Society at various periods, and Mr. Oudaatje had referred to one department in which it had been able to render very useful service. It had been for a century the practice of men, in different parts of the world, who had not the appliances which were available here, to send their products to the Society of Arts for investigation; and sometimes, by their mere exhibition in that room, they had developed into large branches of industry. The subject was a very wide one, because there was waste in every direction, and what was waste at one moment became utility at another. The waste of resources in this country, instead of being a subject of pride, was really most melancholy. He had taken a deep interest in this subject for a long time; he believed he was the means of developing the reduction of palm oil, which had largely increased the amount of that commodity brought to this country; and it was in the power of anyone, if he applied himself to some one particular subject, to do an immense deal of good, whilst by following always in the wake of others a man's work was unprofitable, both to himself and to the community.

COLLEGE LITERATURE.—Although magazines and journals edited by undergraduates are published at many colleges and universities the idea of a Christmas number is undoubtedly a novelty in college journalism, but from the manner in which the first effort of the kind has been received by those interested in the University of King's College, Windsor, N.S., it is likely that the example will be followed elsewhere. The Christmas (1882) number of the King's College Record really possesses considerable literary merit, and is worth preserving as an evidence of the good work done in "our oldest Colonial University." The opening piece is a brilliantly written poem on Louisburg, which has been described by the historian as the Dunkirk of America, from the strength of its fortifications. It is by Mr. B. W. Roger-Taylor, a gentleman nearly at the end of his undergraduate course, and the fact that it earned him the President's prize for English rhymed heroic verse suffices to indicate its merit. Reminiscences of Oxford—all the associations of King's College have always been Oxonian in character, and the present visitor (the

Lord Bishop of Nova Scotia) and president are both Oxford men—will awaken many a pleasant memory; it and the other original and editorial articles and sketches, whether serious or jocular, reflect great credit upon the authors, and indicate a control over the beauties and fulness of the English language of which many writers of maturer years might well be proud.

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THE TURNERS' COMPANY.—A special court of the Turners' Company was held on Thursday at the Guildhall, London, to present the freedom and livery of the company to Dr. Siemens and Dr. John Percy. Mr. Henry Young, Jun. (the Master), presided. The clerk read the resolution arrived at in October to the effect that the freedom be presented to Dr. Charles William Siemens, in recognition of his eminence as an engineer, his successful application of physical science to valuable practical purposes, especially in electricity and metallurgy, and his personal support of technical education. Mr. John Jones introduced Dr. Siemens, and the Master clothed him with the livery and tendered the congratulations of the company. Dr. Siemens, in reply, spoke of the value of the ancient trade guilds, and praised the modern efforts of the City companies to further technical education. Dr. Percy was then presented with the freedom and livery, in recognition of his distinguished scientific attainments, especially in connection with metallurgy. Dr. Percy replied, acknowledging the honour conferred upon him.

CORNISH MINING AND TECHNICAL EDUCATION.—The want of knowledge displayed by Cornish miners has frequently been the subject of remark, and it has more than once been urged that German or Chinese miners would make handsome profits where Cornishmen would starve through their total inability to extract more than a small proportion of the valuable metal from the ores they raise. The ores raised in Cornwall are sufficiently rich to yield handsome dividends to the shareholders if they were properly handled after they are brought to surface; but at present the shareholders' proportion of the returns are suffered to pass away with slimes and rubbish, and the mines scarcely pay salaries and wages; and all through the ignorance of the managers and captains. This view is confirmed by the remarks of Mr. T. Pryor at the Dolcoath meeting on Monday. He said that he had prepared some figures relative to the general rating of the mines in the Camborne, Illogan, and Redruth parishes, which, he thought, would be interesting to those present. He found that the rateable value of Camborne parish was about 35,000*l.*, and Dolcoath alone paid one-fifth of the whole of those rates. When they looked into the question and saw that they had to pay in Dolcoath one-fifteenth dues and 100*l.* an acre for damaged land, and, perhaps, 4*l.* an acre for land partially destroyed, he thought they would see that the mines had to contribute a little more than they ought. The total rates paid by the mines and the tin streams in Camborne amounted to nearly one-third of the whole of the rates in the parish. In Illogan parish the figures were more astounding still, the rateable value being 30,000*l.*, and the mines and tin streams paid nearly one-half of that amount. At Redruth the mines paid nearly one-thirteenth of the rates. It struck him that if the Mining Institute of Cornwall would take up the matter it certainly might do some real service to the mining community of the county. Another thing that struck him very forcibly was the enormous amount of tin going down the Red River. The dues paid by the tin streamers on that river last year from, he might say, four mines in Camborne parish—Dolcoath, West Seton, South Condurrow, and Wheal Grenville—amounted to 1800*l.*, or he might take it that something like 18,000*l.* worth of tin went down the river from those mines. Now, if they went to the tin-dressers in those mines they would say that they had returned all the tin sent to the stamps. From the mines in Illogan the dues paid on the Red River last year amounted to 2400*l.* If they put the whole of those dues down at an average of one-tenth, they would find that no less than 42,000*l.* worth of tin went down the Red River last year. He thought this ought to open the eyes of the mine managers, and they ought to see whether something could not be done to prevent this loss to the mines. Dolcoath was just now the only regular dividend-paying mine in Camborne, and East Pool was the only one in Illogan, and in Redruth he was sorry to say there was no dividend paying mine. He

hoped the matter would be taken up, and whoever would do it would do great justice to the mining community.

REPORT FROM CORNWALL.

Jan. 11.—In some respects the year has not opened so badly. An advance in the tin standard, though only of 2s. (88s. to 92s.), is a small mercy for which we must be thankful. The course of the copper market has also shown an upward tendency. And within the week three mines have declared dividends—East Pool, Condurrow, and now Dolcoath. If we could only move on at this rate, or anything like it—but that would be quite too much to expect—the mining districts would assuredly not know themselves. However, it would never do to discount our chances and depreciate prospects that may fairly be regarded as something more than merely hopeful.

Dolcoath account is somewhat disappointing. Of course everybody expected a falling off in the dividend, and everybody knew it was owing to no fault in the mine or the managers. The drop in the price of tin did its part in the reduction of the profits from 8794l. to 6450l., and the wet season did the rest by preventing the anticipated quantity of work being done in the bottom of the mine, and thus reducing the returns by some 10 tons, whereas an increase had been anticipated. So far as the mine is concerned, there is but the pleasant repetition of the old story—"richer than ever." The deeper the workings go the larger the lode becomes, and the more distant do signs of exhaustion appear. In fact, there are none. Even at the present price of tin the lode in the engine-shaft sinking below the 364, the deepest point of the mine, is worth 200l. per fathom. There is no matter for disappointment here.

Where the disappointment comes in is the absence of any well-considered attempt to grapple with the smelting difficulty, though we are not prepared to say that some progress was not manifested. When Capt. Josiah Thomas plainly states that the idea of competition among the smelters is a farce, and that the attempt to realise it has only resulted in disaster, surely the adventurers in a concern that returns its produce by the hundred thousand pounds annually will see the necessity of making some effort to help themselves. There was a time, as Capt. Thomas reminds us, when all the Dolcoath tin went to two smelting-houses. That was denounced, and rightly, as a monopoly, but the result of doing away with the monopoly in favour of share competition has, according to the figures given, been a loss of 37s. 6d. a ton on every ton of black tin sold. Is it possible in the face of such a statement as this to defend the existing system for one moment? Capt. Josiah is not inclined to do so, and his remarks read like those of one almost persuaded to be a "home smelter." It is quite true that there are difficulties in the way, quite true that there must be a London agent or broker, or something in that way (but if the smelters have them why cannot the mines?), and there may be bad debts. These are all points more or less problematical, and to be tested by experience. What is certain is that Dolcoath is "losing a lot of money as compared with the former system," and will continue to lose. Surely very little more impetus will be needed to compel a move in the right direction. It was very cheering to hear the careful and well-considered remarks made by the Chairman at South Condurrow on this subject, and we hope that before another Dolcoath account some practical steps may have been taken, or some arrangements made for Dolcoath leading the way. As it is, one opportunity seems to have been missed, and that a good one.

Some very important remarks were made at Dolcoath account by Mr. T. Pryor upon the question of rating of mines. There is probably no part of England in which grosser inequalities exist in reference to rating than in Cornwall and Devon, and in which the need of a general rating law to do away with the vagaries of local authorities is more felt. Mr. Pryor pointed out that the rateable value of the parish of Camborne was in round numbers 35,000l., and that Dolcoath alone paid one-fifth of the whole. Adding this to the fact that they had to pay 1-15th dues, 100l. an acre for damaged land, and, perhaps, 4l. an acre for what they might partially destroy, he thought it would be agreed the mines had to pay a little more than they really ought. The total rates paid by the mines and streams of the parish were nearly one-third of the whole rates. The figures for Illogan parish were still more astounding. The rateable value of that parish was about 30,000l., and the mines and tin streams paid nearly one-half. In Redruth parish they had not so many mines working, and the rates paid by the mines and streams were nearly 1-13th. It occurred to him that if the Mining Institute took this matter up it might render a good service to the county. But what had most struck him was the information the figures gave as to the amount of tin going down the Red River. The tin streamers paid dues in 1881 in respect of what came from four mines in that parish—Dolcoath, West Seton, South Condurrow, and Wheal Grenville—no less than 18,000l., so they might take it that 18,000l. worth of tin went away from these four mines. In the same time the dues paid in respect of the Illogan parish stream from Tincroft, South Frances, East Pool, and West Frances were 2400l. He did not know what the dues were for these mines, but if they put them at an average of a tenth they would find that no less than 42,000l. worth of tin went down the Red River from these two parishes last year. As to the last point, however, it must be borne in mind, as Capt. Charles Thomas pointed out, that a large quantity of the tin assigned to the streams is really purchased in the stone by the bargain buyers, though we hardly think that Capt. Josiah's estimate of 5 per cent. on the Red River profit as a whole is up to the mark. A capital illustration of the way the local authorities will, if they can, saddle mining and allied enterprises is supplied from Devon, where Mr. Collins, the owner of a traction engine working in connection with the Chudley Quarries, has been ordered to pay over 40l. towards the maintenance of the works, as a kind of special rate. Of course this will be fought.

A very unfortunate casualty has occurred at Sortridge Consols by the flooding of the new workings. A few years since Sortridge occupied a somewhat prominent place in the mining enterprise of Devon, and the mine is now being re-worked. For some time the company has been engaged in clearing the old deep adit level, and side ties being driven the men had got nearly 400 fms. from the mouth of the adit, in the direction of the old workings, below the 40 fm. level. The ground had been perfectly secured up to the point where the men were working, and a strong breast-head of slate rock was always kept between them and the old adit. Long holes had been bored at intervals from the side ties to the main adit to ascertain the exact position of the water, a quantity of which has been continuously flowing for some time through the several bore-holes—more rapidly through the last hole bored. According to the plans it appeared that the men had reached to within about 25 fms. of the old mine, and Capt. W. Skewis, the managing agent, gave instructions that the men were to be very careful, and desired Capt. Nicholas Williams, the resident agent, to exercise every precaution. On Saturday morning Edward Crocombe, of Tavistock; Alfred Dawe and Edward Newcombe, of Horrabridge, were working in the adit. Capt. Williams also went in and found the water was not coming away as fast as he could wish. They had made a start to leave, but Williams being anxious to clear the hole, which on Thursday was made to about 3 in. in diameter, and appeared to be choked, they turned back, and Williams directed Dawe to further probe it with the bar. Williams and Crocombe were standing by, while Newcombe was working the barrow about 20 fms. back in a level west of the cross-cut. While Dawe was probing the hole the water rushed in, and he and Crocombe ran for the mouth of the adit as fast as the nature of the ground would allow them. They succeeded in reaching the surface about 12 o'clock, just a few feet ahead of the water, which came down the adit with great force, carrying a large piece of the ramp at the adit's mouth before it into the River Walkham. On their way out the two men saw Newcombe in the level west of the cross-cut wheeling the barrow, and called to him to come on, as the water was upon them. They also heard Capt. Williams call for a light. On reaching the mouth of the adit Dawe and Crocombe at once made their way up to the account-house, where great consternation was caused by the intelligence that the agent and Newcombe were in the workings. At the moment, of course, nothing could be done; but directly the water subsided sufficiently a gallant working party made the attempt to reach the scene of the accident, but were driven back by foul air, in addition to which the passage was choked by debris.

As the bodies of Capt. Williams and Newcombe were not washed out of the mine by the rush, or at least could not be found in the river, and as there remained just the chance that they might be imprisoned alive in the level, the most determined and continuous attempts were made for their rescue, under the direction of Capt. Skewis and Mr. Crispe, the purser, while Mr. Spry, the lord of the mine, was indefatigable in his endeavours, and exposed himself to great personal risk. All hopes were, however, dispelled on Thursday that either of the unfortunate men would have escaped, for the body of Capt. Williams, much mutilated, was found in the debris in the river at the adit's mouth. So far, the occurrence seems to be purely accidental.

TRADE IN SOUTH WALES.

Jan. 11.—The amount of coal shipped at Cardiff in the past year was 5,799,919 tons foreign and 951,197 tons coastwise; Newport, 1,365,105 tons foreign and 898,907 tons coastwise; Swansea, 937,275 tons foreign and 758,642 tons coastwise; Llanelly, 66,318 tons foreign and 109,411 tons coastwise. The quantity sent abroad from Cardiff is about 1,500,000 tons in excess of Newcastle, but in coastwise shipments the latter port bears the palm. Cardiff is now the largest coal-exporting station in the world, as far as regards foreign shipments. The amount sent away from Cardiff last month was 466,820 tons foreign and 75,286 tons coastwise; Newport, 110,379 tons foreign and 69,076 tons coastwise; Swansea, 72,409 tons foreign and 61,083 tons coastwise; Llanelly, 3006 tons foreign and 4091 tons coastwise. Last week the shipments were—Cardiff, 121,295 tons foreign and 13,360 tons coastwise; Newport, 28,409 tons foreign and 17,218 tons coastwise; Swansea, 18,831 tons foreign and 11,504 tons coastwise. Prices rule firm, with an upward tendency, in consequence of the great pressure on the market. Good colliery-screens may be had at about 11s., but inferior qualities range as low as 9s. 3d., while in rare instances 11s. 6d. per ton has been obtained. The men here again re-affirmed their decision not to countenance the movement to lessen the output, and have again declined to send a delegate to the Conference. This makes the path straight for colliery proprietors and shippers in South Wales, and enables them to look forward to a prosperous course in the present year. Of patent fuel Swansea shipped in the year 1882 no less than 273,358 tons, and Cardiff 171,172 tons. Of coke Swansea sent away 28,850 tons; Cardiff, 10,733 tons; Newport, 5527 tons.

At the Merthyr Police Court, on Monday, before Messrs. J. Bishop and E. B. Evans, John Neal, Evan Davies, Patrick Crowley, Garret Fitzgerald, and John Sheen, furnace fillers, were summoned for leaving their employment at the Dowlais Ironworks without giving proper notice. Mr. Frank James appeared for the Dowlais Iron Company (the prosecutors), and in opening the case said that the defendants were employed in filling No. 15 blast furnace in the Dowlais Works with raw material. On the night of the 26th ultimo they all stayed from work, causing the furnace to be stopped, in consequence of which damages amounting to 25l. was sustained by the company. This amount, however, was not assessed in the present proceedings, as the company, wishing to deal leniently with the men, had reduced the sum to 10l., which amounted to 2l. each defendant. Evidence was adduced to bear out Mr. James's statements, and also to prove that notices stipulating that three weeks' notice would be required from each of the workmen by the company, had been posted up in various parts of the works. Some discussion having arisen as to the amount of damages to be placed on the defendants individually (several of them having behaved in a more culpable manner than others), the Stipendiary reserved his decision until that day week. He intimated, however, that he was fully of opinion that a breach of contract had been committed by defendants.

The amount of iron sent away from Newport in the year 1882 was 176,075 tons, being the largest of any part in the country; Cardiff shipped 135,001; Swansea only 6126. Last week Newport sent away 2000 tons to Baltimore, and a small parcel of 98 tons to Paraiba; Cardiff 1977 tons. The amount of iron ore received at Newport last week was 9005 tons from Bilbao, and 4550 from other sources. Cardiff 5857 tons from Bilbao, and 295 from other sources. Prices keep steady at 15s. 3d. to 15s. 6d. per ton.

The liabilities of Messrs. Townshend, Wood, and Co., amount to no less than 666,000l., instead of 350,000l., as first stated. It is anticipated that the estate will not pay more than from 1s. to 1s. 6d. in the 1l. In consequence of the closing of so many works prices naturally went up from 15s. to 17s. per box for I.C. cokes, which was a paying price, but manufacturers are now asking 18s., with the result of causing speculators to hold back, and thus tending to restrict orders. This movement is a bad one, as prices must go up with the efflux of time; but any attempt to grasp more than the occasion requires will only lead to disaster. The number of works at present open will nearly supply the demand for the whole year, with a little pressure the total demand may be met.

REPORT FROM NORTH AND SOUTH STAFFORDSHIRE.

Jan. 11.—The Quarterly Meetings were held in Wolverhampton yesterday and in Birmingham this afternoon. The crucial prices of furnace and forge coal were declared unaltered by the Earl of Dudley's agent on the basis of 11s. and 10s. 6d. for furnace and 10s. for forge coal. His lordship's steam coal was 9s. and 10s. per ton. The majority of the South Staffordshire coalowners present were content with 7s. 6d. to 7s. per ton for forge coal. At Wolverhampton the Lillieshall Company (Shropshire) re-declared their last quarter's quotation of 70s. for hot-blast and 90s. for cold-blast all-mine pigs, and the Staffordshire all-mine makers followed suit, but it was well known upon the market that certainly 67s. 6d., and occasionally even 65s. per ton would have secured supplies of hot-blast pigs from almost any of the makers. Hematites were nominal at 70s. to 67s. 6d., the actual selling price being nearer 65s. than any other figure. At Wolverhampton also Mr. Fisher-Smith re-declared the Earl of Dudley's bars at 8l. 12s. 6d., and other "marked" makers stood at 8l. and 7l. 10s. Plates were 8l. 10s. for tank sorts, and 9l. to 9l. 10s. for boiler qualities. Sheets were quiet, with prices unaltered. Throughout the market, and especially amongst the tin-plate makers, there was much discussion concerning the proposed United States tariff alterations.

At the quarterly meeting this afternoon crucial prices were declared unchanged upon those quoted in Wolverhampton yesterday. All-mine pigs were nominally 67s. 6d. to 70s., but in reality 65s. was nearer the actual price. Marked bars remained at 8l. 12s. 6d. for Earl Dudley's, and 8l. to 7l. 10s. for other best makers' bars. The amount of business done in any department was disappointing. The Welsh tin-plate makers held their quarterly meeting here, and it was announced that good Welsh cokes were quoted 17s. to 17s. 6d. per box, but merchants mostly refused to give the figure. Charcoals were quoted 21s. to 22s. The Cannock Chase colliers' delegates waited upon the masters to-day and asked for a rise of 14d. per stint; the request was refused.

Silver's Diamond Light Company exhibited samples of their carriage and other lamps; Mr. John Spencer, of the Globe Tube Works, Wednesbury, wrought-iron tubes, galvanised, enamelled, and oxidised by Barff's "anti-corrodo" process; the Phosphor Bronze Company, specimens of their various manufactures; W. and T. Avery, their self-registering weighing machine beam; Mr. John Lee, samples of Spanish and Greek ores; J. C. and W. Lord, Llewellyn's patent time checking machines; Mr. L. Shadwell, Street's patent photographic printing frame, for copying drawings, photographs, &c.; T. Smite and Co., non-conducting boiler coverers; and Harris and Pearson, fire-brick, &c.

A special Conference in connection with the Midland Counties Federation of Miners was opened on Monday, at Walsall. Delegates were present from Salop, Derbyshire, Westbromwich, Cannock Chase, Darlaston, the Forest of Dean, North Staffordshire, and Sandwell, representing in all some 65,000 men. The President of the Federation (Mr. H. Rust, of Westbromwich) during the first day's proceedings said that he had reason to believe that, as the result of an appeal which the Federation had made through Mr. E. Fisher-Smith to the coalmasters of the district, the miners would receive an advance of wages shortly. Yet at a subsequent stage of the proceedings when complaint was made that, although some coals had been raised 2s. 6d. per ton in the Cannock Chase district, there had been no advance of wages, it turned out that this advance of 2s. 6d. was required to raise the average price of coal to 6s. per ton, which entitled the men to 2s. 44d. per day, or "stint," and that before the rise in price they were receiving 2s. 54d. Ultimately the

opinion of the Conference was summed up in a resolution which stated "that the wages of the miners of Great Britain are too low to enable them to live respectably and keep out of debt." As to hours of labour, which formed the chief subject of debate on Tuesday, the Conference passed a resolution approving of the recent decision at Leeds—that steps be taken for terminating all existing sliding-scales at the end of the present year. The restriction of output question also took up a little attention, and the discussions resulted in the Conference advising the workmen employed in the Midland counties to assist other counties in carrying out any well-devised scheme of restriction.

The ironmasters of North Staffordshire have given their operatives the 2½ per cent. rise in accordance with the decision of the President of the Wolverhampton Wages Board. The ironworkers are now receiving higher wages than a year ago by 10 per cent., and it may be hoped that for some time to come the wages of all the ironworkers amenable to that board will be once more determined without friction by the self-working sliding-scale.

Mr. S. D. Williams, of Malvern and Birmingham, has joined the board of the Midland Carriage and Wagon Company, and Mr. T. Campbell Evans, of London (late of the Indian State Railways), has also joined the board as director and consulting engineer.

Mr. Collett, director of Admiralty contracts, received a deputation from the Chamber of Commerce, Wolverhampton. Representatives of the trades of the Midlands stated that competitions from Glasgow, Newcastle, and other northern centres in the supply of navy hardware stores had become very keen, and requested a reduction of rates to the dockyards, similar to those they had already obtained upon army supplies. Mr. Collett promised to move for a reduction, and granted several minor requests tending to relieve the Midland manufacturers in this matter, such as the establishment of central depots.

Messrs. Lord, of Great Charles-street, have introduced to public notice in Birmingham a new machine which is likely to be of considerable value in connection with large manufactories, where the time has to be recorded at which the operatives enter the works. It is in the form of a strong iron pedestal clock, with a number of slots at one part of the pillar through which the workmen put their tallies as they pass by. These are received into a cylinder in the interior divided into two compartments, and having a shoot so connected with the clock that the tallies of those who are early and those who are late are thrown into separate boxes. The whole structure is under the key of a superior officer, so that there can be no tampering with it on the part of those interested. The number of compartments is sufficient to check all the times at which workmen are admitted, and the booking of the result need only be done once a day. A great saving of time is also effected in the rapidity with which the workpeople are able to enter the establishment.

TRADE OF THE TYNE AND WEAR.

Jan. 9.—The demand continues good for best steam coal. The weather is open, and shipments are expected to be large this week. There is also a good demand for second-class steam, for small, and manufacturing descriptions. There is much anxiety about the pending settlement expected to be made between the Northumberland miners and the steam colliery owners. It is hoped the sliding-scale will be renewed in some shape. The return of the accountants under this scale show that there has been a slight reduction in the price of this coal during the past three months, as compared with the previous account.

There is a very strong demand for gas coal, the output of which will be very large this year. One of the largest gas coal collieries in Durham have contracted to supply over three-quarters of a million tons of this coal during the present year, the price being 3d. per ton over late prices. Merchants and producers here are keenly canvassing the effects that the expected alterations of the American tariff may have if accomplished. Both political parties in the State are committed to a reduction of the tariff, and this may cause an enormous benefit to the trades here. If pig-iron is reduced we shall send much more, if the Americans admit iron duty free for ship-building. Our plate mills will be largely benefited, and if they allow the free purchases of vessels, we shall sell many, and the iron trades will be greatly stimulated. At the moment, exports to the United States are very limited, though stocks there are small, owing to the expected fall in duties. The decision of the Senate must be come to before March 4, and will be awaited here with the keenest anxiety. The house coal trade here is very brisk at present, the demand for shipment to London and the coast is large, and the home demand is also very good at present. Trade at Tyne Dock has been very active since the conclusion of the holidays. On Friday, the shipments were 19,000 tons, which is much above the average. The shipments of coal from Sunderland continues very heavy, and are likely to continue. On Monday, 12,000 tons were shipped, of which over 5000 tons were for London.

The salt deposits on the Tees are likely to be largely worked shortly. These remarkable deposits were discovered originally by Messrs. Bolckow and Vaughan while sinking and boring in search of water. Now that salt is being made and sold by Messrs. Bell Brothers, Bolckow and Vaughan, Mr. Williams and others will follow in the same track. Both these firms are about to put down holes and suitable apparatus to enable them to pump the brine and manufacture salt for sale in the district. No doubt chemical works will also be ultimately established on the River Tees.

The construction of the Gateshead tramways has been commenced, and considerable progress made. They are to be worked by steam locomotives, which will be erected by Messrs. Black and Hawthorn, of the Gateshead Engine Works. The engine is the patent of Mr. Wilkinson, of Wigan. This engine having proved a great success, it has, we believe, eclipsed all other engines constructed for this purpose. It is a very light and also effective engine, and it is worked very economically. Steam locomotives have been tried on the tramways in this district, but they have not proved successful, and they are now worked almost exclusively by horses, but no doubt is entertained of the success of the Wilkinson engine, as it has been fully tested in other districts, and it has been proved that the lines can be worked much more economically by this engine than by horse-power.

We have often in this letter quoted statistics of the coal and iron trades from Brown's Export List, which is published monthly. This year they have published a supplement, which gives the quantities of coal, &c., exported during the past two years, which possesses much interest, and it bears out the views we have lately expressed respecting the progress of the coal and other trades in this district. In coal exports the comparative totals show a general improvement over all the North-Eastern ports for the year, the increase being 39,987 tons. The grand total amounts to 13,000,000 tons for those ports. Those totals show the shipments to both English and foreign ports. The total shipments of coal from the North-Eastern to British ports during 1882 was 6,343,178 tons; in 1881 they amounted to 6,400,442 tons. During the past 12 months the shipments of coal to foreign ports have been much more active than the shipments to British ports. In 1881 there was shipped from the nine North-Eastern ports to foreign ports 7,014,273 tons of coal; the total for 1882 is 7,117,502 tons, the increase for the year being 103,229 tons. Of the North-Eastern ports, North Shields and Sunderland show the greatest improvement. The North-Eastern ports have also added considerably to the value of goods, exclusive of coal and coke exported during 1882. In 1881 the total value was 5,781,967l.; in 1882 the value has been 6,781,853l., showing an increase in the total value of 998,886l. To this increase Middlesbrough has contributed no less than 700,756l., and the Hartlepool 272,565l. The almost unprecedented improvement in the value of goods exported from Middlesbrough is due to the increased shipments of steel rails.

The iron trade has been rather quiet. The quarterly meeting will be held next week, when the course of the trade will be more defined; but unless an increased demand occurs the price of pig-iron is not likely to be increased for some weeks. It is not expected that there will be much pressure for shipments, and the price of manufactured iron continues low. The finished ironworks do not begin

the year favourably; not only are prices low, and some of the works not making profits, but there is a lack of speculation. The plate works have good orders booked, but there is in this branch also a scarcity of specifications. The works, with few exceptions, are to be stopped this month one day per week, and some are closed the whole of the week. This may bring forward more demand from ship-builders, and if the price is kept down, as at present, for any length of time, the price may be improved. This is at present the great aim of the plate-producers. The angle and the bar trades are also rather dull. The rates of manufactured iron are—Bars, 6s.; angles, 6s. 17s. 6d.; ship-plates, 6s. 10s. Messrs. Connal's stocks at Middlesbrough are 96,527 tons; a decrease of 2080 tons in Glasgow; 606,000 tons are held. The quarterly meeting of the iron trade was held on Tuesday, at Middlesbrough. Business was extremely quiet, and prices tended downwards. Some exhibits were shown on the Exchange. The leading one, which attracted much attention, was Mr. C. Woods portable railway. The iron shipbuilding trade commences the year with excellent prospects. Many of the firms have orders which will keep them employed the whole of the present year. A great impetus has also been given to the marine engine and boiler trades.

We should not omit to notice that the exports of coals and coke from this district do not give an adequate idea of the output of coal during the past year. The exports in 1882 we have shown have been maintained as compared with the exports in the previous year, but there has not been a large increase; but the total output has, we have no doubt, been largely increased, more especially in Durham, as the consumption of manufacturing coals at the ironworks and local factories has been largely increased, and the make of coal has also been increased considerably, the great bulk of the coke made being consumed at the Cleveland iron furnaces or sent to the works in the Midland and Cumberland districts. Heavy contracts are held by the Durham coke manufacturers for the supply of the ironworks and furnaces in those districts, and better prices are got for the coke thus disposed of than for export.

Mr. Barkas has given an able lecture in Newcastle on the subject of the proposed ship-canal from Newcastle to the West Coast. The chief promoter of the scheme is Mr. Andrew Leslie, the eminent shipbuilder, and he is confident that the canal can be constructed at a reasonable cost. Mr. Councillor Dickinson intends to take the earliest opportunity of moving a resolution in the Newcastle City Council in favour of the scheme.

REPORT FROM DERBYSHIRE AND YORKSHIRE.

Jan. 11.—Work has been generally resumed throughout the mining district, but there does not appear to be any marked activity, either as regards metalliferous or coal mines. In the lead districts of Derbyshire everything moves along steadily, the production of ore being kept up to about the average. Many of the mines for a long time past have been unproductive altogether, whilst at others where work is carried on in the old style a living appears to be all that is looked for by those who take advantage of the peculiar mining laws of Derbyshire, to open out ground for the purpose of finding ore. As might be expected under such circumstances, not much progress has been made of late years, for even moderate success can only be obtained by an outlay of capital, and those who have it seem not to be strongly impressed with the advantages of laying it out in the Derbyshire mines, many of which now standing no doubt could be worked at a fair profit. The chief owner of the lead mines in the county has a large capital invested in them, and by putting down the most modern and efficient plant has reaped the advantages that enterprise, so backed up, is sure, sooner or later to secure. It is now said that a most important discovery has been made at the old Magpie Mine, consisting of a valuable lode of zinc ore, but of which more will be heard before long. The mine has certainly not been a great one, for during several years there were no returns as to ore being obtained from it; but so far back as 1872 it is stated to have raised 182 tons of ore, of the value of 2262*l*. However, it is to be hoped that the report will prove correct, and that it will be the means of more attention being paid to the district as well as to those adjoining it.

The coal mines have been working fairly; there is no marked demand for either household or other qualities. Transactions with the Metropolitan have been of a moderate character for the time of the year, and the prices realised are by no means what they ought to be considering the advance of wages that was made not so long since. The men have had one or two meetings with respect to limiting the output of coal, but nothing definite appears to have been done with respect to it. In nearly every district there is an evident unwillingness to take the initiative, or precipitate a conflict with employers. The first step will undoubtedly be to give notice to terminate the existing contracts and enter into new ones, by which the men would be allowed to work just as they pleased, or something very much like it. It is scarcely to be expected that masters will give way in the manner they are expected to do, although there is no knowing what concessions a few of them are prepared to make so as to keep their mines going. But it is plain that if only five days a week are worked instead of six, then there will be an increase in the cost of production, whatever there may be in the price of coal itself. At the Coates Colliery there has been a dispute with respect to the introduction of safety-lamps. The owners have considered it necessary, after the explosion at Clay Cross to have safety-lamps at least in some parts of the mine, more especially in the working places, and for the change the men have asked for an increase of 4*d*. per ton for cutting the coal. This, of course, is out of the question, more especially after the men have received a 10 per cent. advance on their wages. One thing must strike those who have paid any attention to the subject, and that is the modesty of the men in asking to be subsidised for working in the manner which gives them the most immunity from accidents which might result in a great number being sent to their long account by such a catastrophe as took place at Clay Cross not so long since.

The Iron Trade of Derbyshire has opened out favourably, there being a large output of pig, the stocks held being moderate. In merchant and rolled iron generally, business is still somewhat moderate, but there is now every probability of an improvement taking place. At Dronfield, the men have been working steadily at the forge, and at the malleable department as well. What is to be the future of the building erected for the carrying on of the railroads of Messrs. Wilson and Cammell is still scarcely even speculative. But it is to be hoped that some capitalists will be found that will utilise it, seeing that it could be adapted for more than one branch of the iron or steel trades.

In Sheffield, business is now in full swing, and some branches are more than usually busy. Advantage was taken of the holidays at more than one place for making additions, so as to increase the productive power of the plant. The mills engaged in composite armour plates are as active as they can well be, for there are very heavy contracts on hand, and as these no doubt will be supplemented by others, there is a long and busy season for the hands employed in the various departments of the Atlas and Cyclops Works.

In both crucible and Bessemer steel there is plenty doing, and considerable quantities of the latter in particular were for consignment to America, whilst the home requirements just now are heavy. Plain Bessemer for secondary quantities of cutlery and tools has been in growing request, and there is still a heavy tonnage absorbed by the rail mills. The cutlery houses are doing well, and so also are those engaged in saws, files, and sheep-shears. Makers of light and ornamental malleable material have commenced favourably for the year, and there is every prospect of the demand for the fine castings now produced from this metal greatly increasing, for some of them are now turned out equal to the finest steel in both sharpness and finish. At the engine-works trade is better than it was, and the men are well employed, and the same remark applies to machinists.

There has been no change in the state of the Coal Trade of South Yorkshire, the demand being still only moderate for the time of year, whilst prices are not so good as they were. No action as yet

has been taken with respect to the limitation of the production of coal, even in the Barnsley district, which is the chief centre of the movement.

REPORT FROM NORTH WALES, SALOP, AND CARDIGAN.

Jan. 11.—Among the Bills obtained last session was one for doubling and extending the Wrexham, Mold, and Connah's Quay Railway, and for the construction of docks. Some surprise having been expressed that the works have not yet been commenced, it has been explained that the promoters have been waiting for the approval by the engineers of the Great Western Railway to the plans for a bridge by which that railway is to be crossed, a proviso to that effect appearing in the Bill. Failing the early compliance with this proviso by the engineer it is said that an application will be made to the Board of Trade which, it is hoped, will prevent needless further delay, and the works will be commenced. To an outsider it seems a curious proviso that the approval of the engineer of a rival company should be necessary to the carrying out of the plans. To ordinary people it would appear that some responsible third party would be better in the matter. However, it is to be hoped that there are means of preventing further delay. The limestone quarries in the neighbourhood of Wrexham are busy, some of them sending 400 tons of lime and stone off per day. The machinery from the Clara Consols Lead Mine, near Aberystwith, has been partly transferred to the recently re-started Ochregrig Mine at Llangynog, Montgomeryshire. The owners of this mine have also taken a mine in the Hirnant Valley in the same neighbourhood, where they have commenced operations. The Bwlch Creolas Mine, in the same neighbourhood, is now at a standstill. Hopes are held out that the railway to Llangynog, for which an Act was also obtained last session, will be commenced in the spring. The severe weather has retarded the building operations at the Vyrnwy Embankment of the Liverpool Corporation Water-works; but with the opening of the spring the works will present a busy scene. The Carnarvonshire Slate Trade keeps good, and the quarries at Festiniog and in the Corhys Valley are fairly busy. In South Wales the Whitland Abbey Quarry, famous for its light green slates, has been taken by a Swansea firm, who are going to commence working forthwith. The Coal Trade, with its associated industries of iron and clay, keeps brisk.

COMBUSTIBLE VAPOUR ENGINE.

In the construction of an engine, according to the invention of Mr. SAMUEL CLAYTON, of Bradford, the cylinder is not made in the working part of the cylinder longer than the stroke of the engine, the thickness of the piston, and the width of the ports; it is, in fact, constructed similarly to a steam-engine, no additional length for working purposes being given to the cylinder. The invention also relates to constructing gas motor engines, single acting, fitted with his present improvements. In his double acting gas motor engines he, by preference, uses a pump having a shorter stroke than the stroke of the working cylinder. The pump and cylinder are secured to the foundation-plate of the engine, and also to the sides of the two projecting boxes or firing chambers cast or fitted on the side of the cylinder. The pump is also fitted with valve boxes and valves for the admission of air, gas, and air into the pump. The boxes or firing chambers cast or fitted on the side of the cylinder are fitted with plates, leaving a space between the plates and the inside of the chambers, in which is placed non-conducting heat material, such as silicate of cotton or any other suitable non-conductor to prevent radiation of heat, and he can employ firing chambers without any lining or non-conducting heat material.

Between the two firing chambers is an open space in which is placed the igniting tube or tubes or any other firing apparatus, and in connection with two sliding valves which are fitted to the firing chambers, but the valves may be dispensed with by placing separate tubes to each chamber, and having an adjustable light to heat the tubes at a regulated distance. The two sliding valves are actuated by gear and in turn and at the required time to allow the firing of the compressed mixture to actuate the piston of the working cylinder at the in and out stroke of the piston. In the space between the firing chambers is fitted a tube, by preference of metal, and having a hollow ball in or near the centre, and a gas jet is kept burning under the hollow ball heating it to a red heat, which heat being conveyed into the interior of the tube and ball causes the mixture admitted into the tube and ball by the opening of one of the sliding valves of either firing chamber to fire and explode and fire the compressed mixture in the firing chamber, which passes through a port or opening into the cylinder actuating the piston.

The double action of the working cylinder is this. On the outward stroke of the pump piston he draws into the pump a charge of air and gas and air, and on the return of the pump piston he forces through a valve fitted in the firing chamber the mixture and compresses the same in the firing chamber. At the same time he forces in the mixture he compresses and draws in on the opposite side of the pump piston a fresh charge of air, gas and air through similar valves which on the return stroke of the pump piston he forces in and compresses into the firing chamber; these chambers are formed or fitted at the side of the working cylinder, and the cylinder is fitted with covers at both ends, the front cover being made with a stuffing box and glands. The mixture forced and compressed in the first firing chamber, which may be for either the in or out stroke of the piston, is then fired by the action of the sliding valve opening, which admits the compressed mixture into the tube or ball, or to the ordinary firing valve, which ignites the mixture and forces the same through a port into the cylinder actuating the piston. At the same time the other side of the piston forces out the burnt incombustible mixture through the exhaust port and valve at the opposite end of the cylinder, and when the piston arrives near the end of its stroke, the exhaust valve closes, and the remaining residue of the burnt gas or incombustible mixture passes through the cylinder port, causing a valve fitted in the end of the firing chamber to lift and force the said residue into the firing chamber, giving an additional compression to the mixture already forced and compressed therein, and at which point the firing of the mixture takes place and the piston is propelled the other way and the burnt gas or incombustible mixture of the previous explosion is forced by the action of the piston through the exhaust port and valve fitted on the other end of the cylinder in a similar manner to that hereinbefore described; it is obvious that when the burnt gas or incombustible mixture is forced into the firing chamber of either the in or out stroke, the sliding valves open and the mixture is fired and passed through the port of either the in or out stroke, actuating the piston, giving an in and out stroke of the piston or a double acting action to the engine. The valve for admitting the explosive mixture is actuated by suitable gear to lift or close the valve at a proper time, also when the engine is running in excess of its speed the valve is held open by the governor and gear when no gas is required, so that the air instead of being compressed in the firing chamber, passes out of the firing chamber, through the cylinder and exhaust valve.

NEW SECONDARY BATTERY.—It is well known that in an ordinary galvanic battery the electricity is generated by the oxidation of a metal—generally zinc—whereas in a secondary battery the metal is in the state of an oxide to begin with, but is deoxidised by a current of electricity usually obtained from a dynamo-machine, and by the subsequent oxidation of this recovered metal nearly the whole of the electricity expended upon the deoxidisation is reproduced. In Planté's battery the metal employed is lead, which is allowed slowly to oxidise by immersion in diluted acid, so as to form the organism of the battery. But in Faure's improvement upon this a coating of oxide of lead is laid upon the metal, by which a great saving in the time necessary for the creation of the battery is effected. In the improved accumulator just exhibited and explained by Mr. G. Grout before the students of the College of Practical Engineering, at Muswell Hill, a central core of lead is introduced into each cell, and this core is surrounded by a layer of enveloping charcoal, among which finely divided lead has been disseminated so as to pervade every pore, and the immense area of the leaden film thus presented

for oxidation facilitates the process and correspondingly increases the quantity of electricity generated. The metallised charcoal may, if desired, be moulded into plates like those of an ordinary galvanic battery, or it may be applied in other forms—the only material point in all forms alike being the great extension of the oxidising surface. Mr. Grout showed in operation a secondary battery of 26 cells deoxidised by a dynamo-machine of the Brush construction, and he explained to the students the identity of the principles which govern the production and action of electricity with those which underlie the whole fabric of engineering science. Several electric lights were shown of absolute steadiness and great brilliancy, and it was explained that there is nothing to prevent electricity from now being supplied like gas by meter, not merely for the production of light, but for the convenient and economical generation of power. The demonstration of the efficacy of this new battery was in all respects most successful, and Mr. Grout's exposition of the condition and prospects of electrical art opens a large vista in the future.

INTERNATIONAL ELECTRIC EXHIBITION AT VIENNA.

The arrangements for the Electric Exhibition, to be held in Vienna from Aug. 1 to Oct. 31 of the present year, are making satisfactory progress. The Exhibition was authorised by decree of June, 1882, which at the same time gave permission to hold it in the Rotunda and other remaining buildings of the 1873 Exhibition. To organise and carry through the Exhibition the necessary committees have been formed, and a managing committee has been appointed to carry out the resolutions passed by the General Commission and by the several committees, and to manage all matters relative to the undertaking. The exhibits to be admitted are divided according to the principle which they embody into the classes—1. Magneto-Electric and dynamo-electric machines.—2. Galvanic cells, batteries, accumulators, thermo-electric piles.—3. Scientific apparatus, instruments for electrical measurements, electro-static apparatus.—4. Telegraphs.—5. Telephones, microphones, photophones.—6. Electric lighting.—7. Transmission of power.—8. Cables, wires, conductors.—9. Application of electricity to chemistry and metallurgy. 10. Application of electricity to war.—11. Railroad and electrical appliances.—12. Application of electricity to mining, navigation, and agriculture.—13. Electro-Medical apparatus.—14. Application of electricity to automatic registration, to horology, meteorology, astronomy, and geodesy.—15. Miscellaneous.—16. Application of electricity to domestic use, to art-industry, and decoration.—17. Application of Machinery to electrical industry. Boilers, steam, gas and hydraulic engines.—18. Historical collections. Methods of instruction. Bibliography. Applications for space must be in the hands of the Managing Committee of the International Electrical Exhibition, Wallfischgasse, Vienna, at the latest by March 1. Printed forms are to be obtained in Austro-Hungary from the Managing Committee, the Boards of Trade and Commerce, from the Scientific and Commercial Societies, and abroad from the Austrian-Hungarian Consuls.

The General Commission has taken the necessary steps to enable exhibitors to enjoy the advantage of the patent laws from the time of the entry of their goods to the Exhibition grounds until exit therefrom, and to enable foreign exhibitors to enjoy exemption from duty in case of the re-export of their goods before the end of the year 1883. No prizes will be awarded by a jury. During the Exhibition a technical and scientific commission will be organised in co-operation with the exhibitors, in order to carry out electrical measurements and other scientific investigations, with a view to testify results. The General Commission will make arrangements for scientific and technical lectures. The net proceeds of the Exhibition will be devoted, with the sanction of the Imperial Ministry of Commerce, either to such scientific institutions as may carry out further the aims of the Exhibition, or to the pursuit of important inventions in the field of electrical science.

ON KEITH'S PROCESS FOR REFINING ARGENTIFEROUS LEAD.*

Keith's method of refining argentiferous lead consists in the electrolysis of the solution of a lead-salt between an anode of furnace-lead and a cathode of soft sheet-lead, or copper-plate, lead of a greater or less degree of purity depositing on the latter, while the released oxygen and acid attack the anode, dissolving an equivalent amount of lead, leaving silver and other foreign metals undissolved, which go down in the form of mud. The principal is, in fact, the same as that involved in electrolytic copper refining, but owing to technical imperfections and difficulties, it seems unlikely to attain any great practical importance.

The form in which the lead separates, unlike that of copper, is very unfavourable for handling, as, instead of being coherent, it invariably takes a dendritic crystalline form, the plate spreading from the cathode in all directions; penetrating the muslin bags enclosing the anode, they reach the latter and establish metallic contact between the electrodes. It is only when these are at comparatively large distances apart that the crystals of lead subside to the bottom of the tank, but this increase is attended with increased electric resistance on account of the greater mass of fluid to be traversed by the current, which can, indeed, be corrected by using electrodes of larger surface, necessitating vessels of larger dimensions and a greater weight of lead plates, as these cannot be reduced below a certain minimum thickness. Possibly a mechanical arrangement might be adopted for scraping the deposited lead from the cathodes at short intervals. The voluminous character of the deposited lead has another disadvantage, as being very easily oxidisable when heated, it cannot be remelted without being first compacted by hydraulic pressure. The purity of the deposited lead also leaves much to be desired, as thereby the whole of the zinc that may be present in the furnace lead goes down with it.

The following result was obtained in an experiment made at Clausthal upon lead obtained in the treatment of the regulus produced in the first or ore-furnace process, and which contains most of the copper and antimony of the original ore. Three plates of this lead were sewn up in close linen bags, and three similar plates of rolled lead were used as cathodes. The liquor used was a solution of sugar of lead containing 77.92 grains of lead per litre, to which about 4 per cent. of acetic acid was added. The effective surface of each electrode-plate was about 13,000 square millimetres. After the current from two Meidinger-Pincus balloon cells with 39,000 square millimetres surface of zinc plate has been passed through the apparatus for 456 hours, the quantity of lead precipitated weighed 680 grams, and the residual metallic mud in the bags 11 grams, the composition of the different products being as follows:—

Lead operated on.	Deposited Lead.	Residue.
Lead.....	98.79667	99.99297
Bismuth.....	0.00376	0.00305
Copper.....	0.37108	0.00060
Antimony.....	0.55641	0.00099
Silver.....	0.25400	—
Iron.....	0.00575	0.00041
Nickel.....	0.00730	—
Zinc.....	0.00271	0.00198
Sulphur.....	0.00132	—
	100.00000	100.00000
		99.635

From these analyses it appears that nearly the whole of the zinc and bismuth present in the original lead are retained in the deposited metal.—H. B.

By HERT HAMPE; (Zeitschrift für das Berg-, Hutten- und Salinen-Wesen, Vol. XXX., 1882, p. 81.)

* From JAMES FORREST'S "Abstracts of Papers in Foreign Transactions and Periodicals," for the Proceedings of the Institution of Civil Engineers.

MINING INSTITUTE OF CORNWALL.—At the recent Exhibition held at Camborne a very neatly arranged case of samples of safety-fuse was shown by the British and Foreign Safety Fuse Company,

of Redruth, Cornwall, and the quality and finish of each description well merited the bronze medal which was awarded for excellence of manufacture.

INDUSTRIAL METALLURGY—FOUNDRY PRACTICE.

Those who had the opportunity of examining the beautiful untouched castings shown by Sir Joseph Whitworth at the International Exhibition in London in 1862 will have no doubt as to the perfection to which casting can be carried; yet the annoyance resulting from bad castings when they have to be obtained from an ordinary founder, it may be in a comparatively non-industrial district, is but too well known to all who have had to erect, use, or repair machinery where a large manufacturing town is beyond their reach. This state of things no doubt arises from the moulder's art having hitherto been much neglected, owing, in the first place, to the skill required in the work being unrecognised, and, secondly, to the comparative absence of published details concerning it. These drawbacks, however, will now be removed, a practical American iron moulder and foundry foreman of some considerable experience, Mr. Thos. D. West, of Cleveland, U.S., having just completed a rather large volume—*American Foundry Practice*—treating of loam, dry sand, and green sand moulding, and containing a practical treatise on the management of cupolas and the melting of iron. By Thomas D. West, New York; John Wiley and Son, Astor-place—in which he explains all the niceties of manipulation required to secure results, which will prevent disappointment to the workman, and give satisfaction to those who will use the casting.

Some of Mr. West's remarks are at once amusing and truthful, and will teach more than dry technical facts stated in a less interesting manner. He says that the moulder should admit that when he loses a casting he has had full control of, it is no more nor less than his ignorance or carelessness that caused the loss; the proof is that when he makes it a second time he gets a good one. It takes a moulder that is a sweet talker to get out of the blame for a bad casting when he knows there was no one to blame but himself. A casting made by a half-drunken moulder would be more likely to be good than one made by a nervous moulder. Moulding is like a man fishing, he cannot see what he will get until it is out of the water; and he may spend all day working hard to catch something, which when brought to light will be a worthless minnow.

There are often times when the moulder would forfeit a day's wages if he could only know or see the result that will be obtained from the work he is doing. All branches of the moulder's art are very fully referred to, so that the artisan who has thoroughly studied the book—of course assuming that he has practically worked in the foundry—will be able to undertake any piece of work that may be required of him, even to the moulding of bevel and spur wheels, kettles, or elbow and branch pipes in green sand without a pattern. There are also a large number of notices on the manipulation of iron castings, and a series of notes and receipts. The information is given throughout the volume in straightforward and practical language, and is no more nor less than every moulder requires.

Registration of New Companies.

The following joint-stock companies have been duly registered—

THE LEAD WARRANT COMPANY (Limited).—Capital 60,000*l.*, in shares of 50*l.*. To establish in London, Newcastle-on-Tyne, or elsewhere, warrant yards or depôts for the storage of lead and other metals, and the products thereof. The subscribers (who take one share each) are—W. T. Power, 25, Holland Park; T. Sopwith, 6, St. George's-street; H. Power, 6, St. George's-street; G. Villiers, 9, Albert Hall Mansions; T. J. Bewick, Haydon Bridge; J. C. Swan, Newcastle-on-Tyne; T. B. Bewick, Haydon Bridge.

THE MANCHESTER AND SALFORD MACHINE BREAD FACTORY (Limited).—Capital 30,000*l.*, in shares of 1*l.*. To make bread, cakes, and biscuits of every kind by machinery. The subscribers are—J. Collins, Manchester, 100; W. T. Gunson, Manchester, 50; E. Robinson, Heaton Moore, 100; H. T. Cunliffe, Wilmslow, 100; H. Nash, Manchester, 100; W. Swarbrick, Manchester, 100; P. Gregson, Manchester, 20.

THE NEW HAFOD LEAD MINING COMPANY (Limited).—Capital 10,000*l.*, in shares of 1*l.*. The acquiring by purchase or otherwise of a certain mineral property situated in the township of Hendrebiffa, parish of Mold, Flintshire, and any other mineral property, machinery, plant, materials, or mining rights in that or adjacent counties; the holding and working of same, and searching for, digging, and raising ores of lead, copper, blende, and all other ores, minerals, and metallic substances. The washing, dressing, selling, and trading in the same, and for that purpose to erect all suitable buildings, premises, machinery, &c. The subscribers (who take 50 shares each) are—J. Thomas, Walton, contractor; J. Kilshaw, Bootle, gentleman; E. J. Hall, Everton, gentleman; R. Matthews, Liverpool, accountant; T. P. Hugo, Liverpool, ship storekeeper; J. Bradley, Liverpool, gentleman; J. Hooson, Liverpool, estate agent. The following constitute the first board:—Messrs. Thomas, Kilshaw, Hall, Matthews, Hugo, Bradley, and Hooson; the number must not exceed nine or be less than three. Qualification 50 shares.

ASKHAM BROTHERS AND WILSON (Limited).—Capital 50,000*l.*, in shares of 10*l.*. To acquire the assets and goodwill of a company bearing the same name, and to carry on the business of constructing, laying, and maintaining tramways, streets, roads, and ways, &c. The subscribers (who take one share each) are—J. Lakeman, Pontefract; J. Askham, Sheffield; P. U. Askham, Sheffield; W. L. Mitchell, 6, Smith-square; F. J. Clayton, Sheffield; F. Bland, Sheffield; J. Jones, Sheffield.

LIMB, JOHNSON, AND COMPANY (Limited).—Capital 50,000*l.*, in shares of 10*l.*. The manufacturing, buying, and selling of lace in Nottingham or elsewhere. The subscribers are—W. Limb, Renton, 50; J. H. Johnson, Nottingham, 5; W. Millington, Beeston, 5; S. R. Pruden, Nottingham, 10; M. C. Limb, Beeston, 5; E. Taylor, Nottingham, 1; S. E. Johnson, Nottingham, 1.

THE SUSSEX CO-OPERATIVE DRUG COMPANY (Limited).—Capital 50,000*l.*, in shares of 100*l.*. To acquire and continue an established business at 135, Queen's-road, Brighton. The subscribers are—R. C. Cox, Preston, 80; T. Coleman, Willeston, 10; A. C. Wood, Brighton, 1; R. J. Turner, Brighton, 1; F. Daniel, Brighton, 1; H. C. Cox, Preston, 1; J. Salmon, Preston, 6.

THE METALLIC ENGINE-PAKING COMPANY (Limited).—Capital 100,000*l.*, in shares of 10*l.* and 1*l.*. The manufacture and sale of material used in the construction and working of engines and other machinery. The subscribers are—J. Alexander, 3, Great Winchester-street, 50; P. Vanderbyl, 3, Great Winchester-street, 50; C. Tottenham, 9, Stratton-street, 50; M. Cloete, 9, Gloucester-terrace, 50; J. W. John, 90, Cannon-street, 1; W. T. John, 72, King William-street, 1; W. Toogood, 16, Parliament-street, 1.

THE IMPERIAL STONE COMPANY (Limited).—Capital 30,000*l.*, in shares of 5*l.*. To purchase and carry on an artificial stone, pipe, and cement manufacturer's business established at East Greenwich. The subscribers (who take one share each) are—J. L. Howard, Loughton; F. H. Faviell, 22, Walbrook; J. W. Butler, Blackheath; M. Dale, Wanstead; P. Gellatley, Langton; W. H. Warten, Croydon; E. Gellatley, 109, Leadenhall-street.

THE DENBIGH AND RUTHIN TIMBER AND SLATE COMPANY (Limited).—Capital 20,000*l.*, in shares of 50*l.*. To continue the business of the sale of timber and slates lately carried on by Evan Roberts and Son. The subscribers (who take one share each) are—R. C. Butter, Hendon; A. E. Turnour, Denbigh; F. G. Edwards, Denbigh; R. S. Roberts, Denbigh; W. Griffiths, Denbigh; G. Wheway, Denbigh; W. T. Rance, Ruthin; E. Pierce, Denbigh.

THE BARNES BREWERY COMPANY (Limited).—Capital 10,000*l.*, in shares of 10*l.*. To acquire and carry on in all branches a brewers' and malsters' business. The subscribers (who take one share each) are—H. F. Giles, Surbiton; H. C. Man, Surbiton; W. T. John, 72, King William-street; S. S. Hitchcock, 143, Cannon-street; W. Barber, Mortlake; W. H. Hester, Chelsea; A. C. De Crespiigny, 5, Park-place.

THE ARGENTINE COMMANDITAIRE (Limited).—Capital 21,000*l.*, in shares of 50*l.*. To become partners with R. J. Hardy and C. Hardy

for the purpose of establishing a business of buying and selling lands, agriculture, sugar growing and making, &c., in South America. The subscribers are—J. Henderson, Studley Priory, 120; J. Young, Ballymena, 60; W. A. Young, Ballymena, 60; T. H. Hardy, Ballymena, 120; M. Hardy, Altrincham, 20; M. J. Hardy, Altrincham, 20; M. S. Hardy, Altrincham, 20.

THE LONDON ASSOCIATED CAPITALISTS (Limited).—Capital 50,000*l.*, in shares of 50*l.* and 1*l.*. To promote, purchase, or carry out public works or undertakings in the United Kingdom or abroad. The subscribers (who take one share each) are—G. B. Molleson, 27, West Cromwell-road; W. G. Gibbon, 5, Great Winchester-street; J. W. Crook, Crouch Hill; R. A. Meyer, Queen's Mansions; V. J. Eldred, 11, Queen Victoria-street; E. Broshier, South Hackney; J. J. Chaddorn, 135, Highbury New Park.

THE UNIVERSAL SYNDICATE (LIMITED).—Capital 25,000*l.*, in shares of 5*l.*. To establish and promote joint-stock and other enterprises, and to assist in developing and obtaining capital for the same. The subscribers (who take one share each) are—W. A. Hume, Balham; P. G. Hebblethwaite, Moore Park; J. B. Macfarlane, Balham; R. Angus, 69, Holland-road; H. Headland, Honor Oak; A. Ormsby, 7, Nottingham-place; A. Stein, 17, Great Winchester-street.

THE PATENT HYDRO-CARBON FURNACE AND APPARATUS COMPANY (LIMITED).—Capital 100,000*l.*, in shares of 10*l.*. The acquisition of certain patents and the manufacture and sale of hydrocarbon furnace materials and apparatus for the application of said patents. The subscribers (who take one share each) are—R. Smith, 79½, Gracechurch-street; J. Macnab, 14, Princes-street; J. Irwin, 100, Cannon-street; P. A. Bonetto, 19, Buckingham-street, Strand; J. J. Key, Battersea; A. F. St. George, 21, Finsbury Pavement; G. Browning, 18, King-street.

AUSTRALIAN PROCESS OF EXTRACTING GOLD FROM PYRITES.

An industry which seems to be destined to lend a considerable impetus to the development of mining in all the Australian colonies has recently been started at the Fitzroy Ironworks, Mittagong. One of the greatest difficulties which attend the operations of many mining enterprises in this and the adjacent colonies has been that of extracting the gold from the tailings and pyrites. There are four kinds of pyrites, whose tenacity for the gold which they are known to contain is so great as to prove in some cases an almost insurmountable obstacle to the thoroughly successful working of certain mines. The pyrites alluded to may be ranged as copper pyrites, iron pyrites, blende or zinc pyrites, and arsenical pyrites, the prefix in each case indicating the metal which predominates. In the majority of gold workings one or other of these pyrites is to be found very abundant, and in some cases they are found to be very rich in chemically bound gold. There is a variety of ways of treating these refractory ores; but whatever process has hitherto been adopted in the colonies has always been found vexatious, inasmuch as the yield of gold has been altogether out of proportion to what was shown by the assay. Amongst those who have bestowed no inconsiderable portion of their time in inventing some process which should obviate the necessity for sending such ores to England, and which should also enable pyrites which at present are not of sufficient value to be exported thither for treatment to be dealt with, was the late Mr. Quist, working jeweller, of Hunter-street.

Mr. Quist was a most determined seeker after some improved method of treating pyrites, and his perseverance was finally rewarded by the discovery of the fact that he had gained the object for which he had been striving—the separation of all the gold from the pyrites; but such discovery was accompanied by the mortifying conviction that he had failed to save the precious metal which he had liberated. It will be seen that the chief difficulty had been surmounted, and the encouragement afforded by this fact was sufficient to induce Mr. Quist to continue his experiments, the result being that he found that the gold when liberated became impregnated in the bottom of the furnace. It was not a difficult thing to suggest a remedy for this evil, but it was found an extremely difficult matter to provide the remedy. The heat to which the furnace was subjected whilst the gold was being extracted was so intense as to test the furnace to the utmost, causing it to present those inviting little apertures into which the gold sunk. What was wanted was a lining or bottom which would resist the intense heat. The attention of the inventor was then directed to securing an absolutely impenetrable bottom which would enable the gold to be extracted, and would then prevent the precious metal from becoming impacted in the bottom of the furnace. Mr. Quist succeeded in attaining this most desired end, but the discovery was soon followed by the death of the inventor.

The development of the invention was continued by Mr. J. T. Leigh, and ultimately a syndicate was formed to give the Quist-Leigh process a trial. The erection of the necessary furnaces would have involved a large outlay; but fortunately the abandoned works of the Fitzroy Iron Company were brought under notice, and permission having been obtained by the syndicate to use the works, Mr. Gustave Fischer, C.E., was entrusted with the designing of plans, and afterwards superintended the erection of the furnaces, which were built under the old chimney stacks. The furnaces are built on the reverberatory principle. They consist of a roasting or calcining furnace, a smelting furnace, and a cupelling furnace. The first of these is supplied with two hoppers at the top, and with two openings in the hearth for withdrawing the pyrites after it has undergone the first of a series of transformations. This furnace is about 23 ft. long over all and 10 ft. wide, and seemed to be capable of receiving for treatment about a ton of pyrites. The second furnace, that in which the smelting is done, is subject to the most severe test, and is that upon which the success of the operation to a large extent depends. This furnace has a peculiarly-designed hearth with an impenetrable bottom, but it is so constructed that the metal is drawn off at the bottom. The furnace is 18 ft. long and 10 ft. wide. The next department is a small house close by, called the assay-house, and which is fitted up with a cupelling furnace. This furnace is supplied with a movable test and a fan-blast. The pyrites which were subjected to the process on Saturday consisted of 17 cwt. from Mr. Mahon's Reef, near Murrumburrah. The assay made when a large parcel of the pyrites was received at the works was 3 ozs. 13 dwts. 6 grs. to the ton. The 17 cwt. was introduced into the calcining furnace by the loppers, and was subjected to a cherry red heat for about eight hours. All but a very small percentage of the sulphur was destroyed, and all the noxious gases, antimony, arsenic, and the usual matrix found in refractory auriferous quartz, were oxidised. The pyrites having been transformed into a mass of clear calcined sand, which still retained whatever precious metals were originally in it, was discharged by the aperture at the bottom of the furnace. A test was then applied to determine the constituents of the calcined sand, and then certain fluxes were added.

What these fluxes were was said to be one of the secrets of the inventor, so that practical men have no confidence that there is anything new or useful in the process, but should it be ascertained that the flux has any peculiar properties, and that it effects what is pretended, it will, no doubt, be widely adopted. The calcined sand and flux was introduced into the smelting furnace and subjected to a most intense heat—much greater, it is said, than that employed in glass-works for eight hours. When the mass has become highly liquefied the slag is discharged by a tap hole in the side of the furnace. All the slag having been run off, the metals are drawn from a separate tap-hole which is situated at the bottom of the furnace. The metals, which are combined, are drawn into moulds, and the ingots thus formed are introduced into the cupelling furnace. Before the metals are introduced into the cupelling furnace an assay is made, and it is this assay which shows whether the operation will be a thorough success or not. The result of this assay should correspond with that made when the pyrites was received at the works. As the lead becomes oxidised it is blown off at intervals by the fan blast as a litharge. All that remains in the test when the operation has been completed is the gold, which is allowed to cool, and is then withdrawn. The cupelling operation occupies between four and five hours, so that the operators are employed for about 20 hours

before the gold is deprived of all the admixtures which cling to it prior to it being manipulated. It is claimed that the process is economical, and that it withdraws from all kinds of pyrites every atom of gold. At the experimental trial, before a number of mining notabilities, the process proved a failure, but this is so common in experiments that it has not at all injured the prospects of the inventors.

COPPER BONANZAS.—It is something amusing to us to so frequently come across the wonderful reports given in our mining exchanges, of copper bonanzas. Copper kings and copper queens, with ore bodies 100 ft. wide, carrying 15, 18, or 20 per cent. of copper, have become so common (reportorially) that we have ceased to smile at their absurdity. If our brethren of the mining press would give the report a little thought, or, what is better, a little figuring, they would not so frequently mislead their readers. On Lake Superior we make no pretensions to 15, 18, or 20 per cent. lodes; we are satisfied with 1 or 2 per cent. lodes, then claim our mines can make a showing for profit that cannot be excelled by the mines of precious metals in the west. Our Calumet and Hecla have paid dividends amounting to nearly \$23,000,000 on a paid-up capital of only \$1,200,000. The Quincy, with a paid-up capital of \$200,000, has paid dividends amounting to \$3,230,000. The Central with a paid-up capital of only \$100,000, has returned its stockholders nearly \$2,000,000. The Minnesota, with a paid-up capital of \$435,000, has paid back nearly \$2,000,000. The Old Cliff Mine, with a paid-up capital of \$110,000, gave its stockholders in return \$2,280,000. The Atlantic's paid-up capital is but \$180,000, yet it paid in dividends this year \$80,000. The Osceola has returned in dividends this year \$250,000, on a paid-up capital of \$380,000, and has returned a total of dividends amounting to \$860,000. But why go further? The figures surely show the solid foundation of our mines, and the inducement they offer to the capitalists who look for certain investments. Our copper mines returned their stockholders over \$23,000,000, or more than ten times greater than their paid-up capital. Such mines need no heralding forth in bonanza head-lines, they speak for themselves, and have compelled some of the best mining men in the country to admit that they are the best managed and best paying mines in the country.—*Outington Miner*, Dec. 23.

LAKE SUPERIOR COPPER MINE DIVIDENDS.—The Hancock Journal has the following truthful figures and statement:—"The total paid-up capital of the copper mines of Michigan which have declared dividends this year is as follows:—

Atlantic.....	\$ 180,000	Osceola.....	\$ 880,000
Calumet and Hecla.....	1,200,000	Quincy.....	200,000
Central.....	100,000		
Total.....			\$2,560,000

The dividends declared by these companies since Jan. 1, 1882, are as follows:—Atlantic.....\$ 80,000; Osceola.....\$ 250,000; Calumet and Hecla.....2,000,000; Quincy.....500,000; Central.....50,000. Total.....\$2,900,000. That is to say, in one single year these five companies have paid to their stockholders \$340,000 more than the aggregate amount of their paid-up capital. Since the beginning of mining operations these same companies have severally paid dividends aggregating \$28,140,000, or an amount only \$20,000 short of being 11 times their full paid capital. The mines are without an exception as prosperous to-day as they have ever been, and are likely to continue their successful career for years to come. The Journal challenges the world to show five other mines with a like record."

THE COPPER OUTPUT.—The following table shows the products of the reporting mines, so far as we have been able to obtain the figures, for the eleven months ending Dec. 1:—

	Tons.	lbs.		Tons.	lbs.
Calumet and Hecla...	18,478	75	Allonox	1,051	765
Quincy.....	2,946	445	Pewabic	823	380
Franklin	1,783	333			
Atlantic	1,701	1736	Total	26,784	234
Net Increase.....				1089 tons	415 lbs.

—*Hancock Journal*.

IRON.—Messrs. W. FALLOWS and Co. (Jan. 10) write:—"The review of the iron trade for 1882 will be found disappointing and perplexing. The year opened with great expectations, but anticipations were not realised. Were it not for the uncertainty surrounding the future of our trade with the United States the outlook for 1883 would be quite satisfactory, but until this is more clearly defined business will fairly be slow and hesitating. Great though our exports were to other countries during the past year, we may probably anticipate a further extension, unless it should be that the present low price ruling for products restrict the buying power of our foreign customers. The home trade promises fairly well. Shipbuilding and engineering trades still maintain an exceptional activity, but there are apprehensions that the great increase made to the tonnage of the world during the last two years may prevent this being sustained for any lengthened period. The disappointing results of the past year must tend also to moderate any very sanguine expectations as to the year 1883."

COPPER.—Messrs. JAMES LEWIS and SON (Jan. 10) write: "With regard to the future course of the market it appears to us that the present position is much stronger than it was at the commencement of the year 1882. The present stock of copper in England and France is a very moderate one, being 3500 tons less than a year ago, while the quantity of stock from Chili and Australia is practically the same, and the value of Chili bars is 6*l.* per ton less. The total exports from England, and consumption in England and France, although only 1000 tons more in 1882 than in 1881, was 19,000 tons greater during these two years than during the two previous years, while the imports into England and France direct were 1000 tons less during 1882 and 1881 than during 1880 and 1879, consequently, whereas the stocks in the two countries increased by 7500 tons during the two latter years, they decreased by 12,700 tons during the two former. Assuming that the rate of production and consumption continues the same during the coming year as during the two past years, we shall have the stocks further depleted at the end of the year to the extent of some 6000 or 7000 tons. We see no reason, except a considerable advance in price, why the production should increase, but, on the other hand, there seems every probability of an increase of consumption. The deliveries from stock in England and France during the past two months were 6000 tons less than during November and December in 1881, consequently stocks in smelters and manufacturers' hands must now be very much less than they were a year ago. Trade shows signs of revival in France. The manufacture of machinery in England appears likely to continue on the same scale as last year; and there is little or no doubt that the use of copper wires for electric lighting will be extended greatly during the coming year."

COPPER AND TIN.—Messrs. FRY, JAMES, and Co. (Jan. 11) write:—"More demand has shown itself for Chilian copper, and a good deal has changed hands, with the result that this description is fully 1*l.* per ton dearer, whilst other kinds also are firmer in price by from 10*s.* to 20*s.* a ton. Tin has been more active than of late, but without any assignable cause. The rally in price of fine foreign is 20*s.* to 25*s.* per ton."

TIN-PLATES.—Mr. ARTHUR HIRD (Jan. 11) writes:—"At the present moment, when the tin-plate trade is going through a very serious crisis, a short review of its actual position will be of peculiar interest to those more particularly engaged in it. It is to be hoped that after nearly seven years' almost uninterrupted depression we may be on the eve of an epoch which, with care and forethought, may bring about an equal period of prosperity to the manufacturers who have so bravely gone through the unprofitable seasons, and disperse the clouds which have so long been hanging over the whole trade. No trade in this country could possibly be in a healthier or sounder position as regards consumption, the growth and extension of which is rapidly increasing, our peculiar position in respect to raw material and labour giving us such advantages over all other countries that, in spite of heavy duties, we practically supply the whole world with their requirements, and our exports to those countries who are themselves manufacturers increase year by year."

HOLLOWAY'S PILLS.—[When inclement weather checks to a considerable extent the action of the skin, an alternative is required to compensate the body by means of other channels. Holloway's pills can be confidently recommended as the easiest, surest, and safest means of attaining this desirable end without weakening the moral courage or increasing the most feeble. When from frequently recurring chills or the inhalation of impure air the blood becomes foul and the secretions vitiated, these pills present a ready and efficient means of cleansing the former and correcting the latter. By this salutary proceeding disease is arrested at its outset, its pains and inconveniences averted, and the nervous structures saved from the depressing effects entailed upon them by an illness.]

COPPER ORES.

Sampled Dec. 20, and sold at Tab's Hotel, Redruth, Jan. 4.

Mines.	Tons.	Price.	Mines.	Tons.	Price.
Mellanear.....	79	£3 16 0	Mellanear.....	48	£2 10 6
ditto.....	76	3 14 6	ditto.....	42	1 12 6
ditto.....	75	3 14 0	Wheal Jewell.....	78	4 0 6
ditto.....	66	3 15 6	ditto.....	30	2 12 6
ditto.....	59	2 6 6	West Seton.....	34	3 17 6
ditto.....	58	2 16 6	ditto.....	27	5 4 6
ditto.....	57	2 8 0	Wheal Comfort.....	17	4 15 0
ditto.....	49	2 6 0	ditto.....	16	11 0 0

Mellanear.....	609	£1850 2 0	West Seton.....	61	£272 16 6
Wheal Jewell.....	108	392 14 0	Wheal Comfort.....	35	165 17

Average standard.....£103 2 0 | Average produce.....5*l.*
Average price per ton.....£3 4 6
Quantity of ore.....811 tons | Quantity of metal.....47 tons 1 cwt.

Amount of money.....£2,621 12 0
LAST SALE.—Average standard.....£108 2 0 | Average produce.....5*l.*
Standard of corresponding sale last month, £92 1 0 | Produce.....6*l.*

COMPANIES BY WHOM THE ORES WERE PURCHASED.

Name.	Tons.	Amount.
Vivian and Sons.....	275½	£819 12 3
P. Grenfell and Sons.....	57	£40 12 0
Nevill, Drace, and Co.....	57	£112 7 0
Williams, Foster, and Co.....	282½	£82 0 9
Total.....	811	£2621 12 0

Copper ores for sale on Thursday next, at the Royal Hotel, Truro.—Mineral parcels.—Devon Great Consols 942—Gunnislake (Gitters) 421—South Croft 325—Marke Valley 175—West Caradon 145—Beaford United 112—Prince of Wales 42—Calestock and Danescombe 22—Old Gunnislake 11.—Total, 2196 tons.

Lectures on Practical Mining in Germany.

CLAUSTHAL MINING SCHOOL NOTES—No. CCVII.*

BY J. CLARK JEFFERSON, A.R.S.M., WH. SC.,
Mining Engineer, Wakefield.
(Formerly Student at the Royal Bergakademie, Clausthal.)
[The Author reserves the right of reproduction.]

When the vessels containing the minerals are raised in cages some provision must be made for holding the cage at the proper level when the corves are being drawn out of the cage, and this is the more necessary where the cage contains more than one deck. This may be done by stopping the winding engine at the exact position, leaving the cage suspended at the proper height by the winding rope. This requires very trustworthy engineers and exact fitting in the arrangements at the mouth of the shaft; it has, however, the advantage where cages with several decks are used of greatly expediting the unloading of the cage. The more general practice is to provide movable supports for the cage, which can be readily withdrawn. Such supports may consist of trolleys, folding doors, horizontal bolts or bars, or of caps or fallers.

As an example of the use of trolleys may be cited the arrangements at the Eschweiler Colliery, near Aix-la-Chapelle. The cage is formed of flat bars rivetted together; the bottom of the cage is an open framework consisting of four cross bars parallel to the length of the corves; two corves are raised at a time. The distance apart of the corves in each pair is slightly greater than the full length of the axes, including the wheels, but less than the width of the body of the corf, the bottom of which overhangs the wheels on both sides. The rails at the bottom of the shaft where the corves are hung on are broken where they would intersect the framing forming the bottom of the cage. When the corves have been run into position and the winding commenced the cage rises the first few inches without lifting the corves until the cross bars catch beneath the overhanging bottom of the corves and raises them. The friction of the bottom of the corves upon the supporting bars is such that there is no liability of the corves moving in the cage. During the ascent the wheels project beyond the bottom of the cage. Arrived at the pit bank the cage is raised sufficiently high to allow of a trolley being pushed beneath it; the rails on which the trolley runs are sufficiently wide apart to allow the cage to pass between them. The cage is then lowered sufficiently to allow the corves to rest by means of their wheels on the trolley, whilst the bottom of the cage is still 1 or 2 in. clear of the trolley. The latter with the full corves is withdrawn, when a second trolley with empty corves is run beneath the cage. The cage is raised, lifting the empty corves from off the trolley; the latter is then withdrawn, leaving the mouth of the pit free for the lowering of the cage.

In metalliferous mines folding doors provided with balance weights are occasionally used for closing the mouth of the shaft, which are opened to allow the passage of the cage, after which the doors are closed, and the cage lowered on them, when the wagons are withdrawn from the cage. Sliding bolts or bars are also used for supporting the cage at the pit mouth, whilst the loaded corves are being withdrawn and replaced by empty ones. The bars are generally placed parallel to the longer sides of the cage, and connected at the ends to blocks which move in suitable slides. The blocks are connected together by links and hinged levers in such a manner that the bars or bolts for supporting the cage move simultaneously inwards or outwards, and are actuated by a lever arrangement. A counterweight is attached to a short lever fixed to the shaft on which the actuating lever is keyed, so that in its normal position the bars project in the position in which they support the cage, and must be moved back and held by hand to allow of the passage of the cage. Where the shaft conductors are formed of angle iron catches formed of curved pieces of iron are sometimes used to support the cage; these are placed in the corners of the rectangular frame at the pit bank; two of these catches are hinged to a common axis attached to the shorter sides of the frame. The catches are curved in such a manner that when in a horizontal position the free ends rest on the longer sides of the frame, so that when the cage is resting upon them the catches are supported at both ends. The construction allows of the cage in its ascent lifting the catches to allow it to pass, but they must be opened by hand through a lever or other arrangement to allow the cage to pass them in its descent.

The most general arrangement for supporting the cage is by means of caps or fallers. These may be divided into two classes—1. Those consisting of four nearly vertical supports which catch beneath the cage near the corners.—2. Those consisting of two long deep plates of iron, or boards faced with iron, which catch beneath the cage close to and parallel to two of the sides. The following are examples of the first class:—At the level of the pit bank is a rectangular frame formed of beams 6½ in. wide by 8½ in. deep. At a distance of 3 ft. 9 in. below this is a second rectangular frame 6 in. less in inside measurement than the first, and formed of beams 7 in. wide by 9 in. deep; upon two sides of this latter are fixed a pair of rocking shafts, each carrying near its ends two nearly vertical bars of iron, 3 in. square in section and 3 ft. 9 in. long, which serve to support the cage. To the upper frame flat springs, 15 in. long, are fixed, which tend to force the upper ends of the supports or caps inwards into the position in which they support the cage. To one end of each of the rocking shafts is attached a lever 12 in. long; the upper ends of these levers are connected by means of a rod to the opposite ends of a straight lever 12 in. long, pivoted at its centre on a pin fixed to the conductor at a height of 15 in. above the top of the lower frame. To the same axis as the straight lever, or forming a prolongation of its upper end, is attached a long lever or handle, the top of which is 4 ft. 6 in. above the top of the upper frame; to this is attached a cord passing round a 7-in. pulley fixed at the same height; the loose end of the cord is laid hold of by the banksman, and pulled when it is desired to draw back the caps to allow the cage to descend. In this second example the main dimensions are the same as in the example above given; the arrangement of the levers for moving the caps is different. To the outside of the cross pieces forming the ends of the lower frame are attached the bearings for two parallel shafts; near the ends of one of these and keyed to it are two straight levers, 3 ft. long, centred on the shaft in the middle of the levers; the upper ends are attached by short links to the fallers. To the ends of the other horizontal shaft are keyed two straight levers, one 18 in. long, and the other about 8 ft. long, with a pin hole 18 in. from the centre of the shaft. The upper end of this lever serves as a handle for the banksman; both these levers are keyed on the upper side of the shaft, and attached by short links to the caps on this side of the frame. From the lower ends of the levers on the opposite side a long connecting rod passes to the upper end of the levers on the first side.

The following example of the second class is taken from Gartsherrie. Close to the mouth of the shaft is fixed a frame of timber, 7½ in. wide and 9 in. deep, the frame being 10 ft. long, parallel to the caps by 8 ft. 6 in. outside measurements; 13 in. below the bottom of this frame is the top of a second frame, 6 in. less each way in outside measurement than the first, made of timber 9 in. deep by 7 in. wide. On the top of the longer sides are placed the bearings for two shafts, on which the caps are hinged; the caps consist of long planks 20 in. deep by about 1½ in. wide; at the middle of the shorter sides of the top frame are fixed bearings for two shafts, 20 in. long, which carry at their ends straight levers keyed on to the shafts at their centres. The upper ends of these levers are connected to the top of the cap on one side, and the lower ends to the top of the cap on the opposite side by means of connecting rods 40 in. long. To one of these short shafts is keyed a long bent lever, the free end of which serves as a handle for the banksman; a counter weight is attached to the short end of this lever.

When cages with several decks are used and the corves are all taken off at one level, if caps as described above are used, these must be drawn back every time it is desired to alter the level of the cage; in such a case it will be found more useful to employ the following arrangement:—Two strong horizontal shafts are placed parallel to two opposite sides of the cage. The shafts are mounted in bearings

on strong beams forming part of the framing of the head gear; on the shafts are placed four loose catches, which in an horizontal position catch beneath and support the cage; two of these catches are placed on each shaft, and close to the bearings for the shafts. The casting forming the bearing has a side projection, on which rests the loose catch, and which prevents the latter from being moved below the horizontal position; this takes off the greater part of the strain from the shaft, and forms a solid support for the cage; when the cage ascends the catches being loose on the shafts are raised without rotating the shafts. By means of clutches on the shaft, however, which catch beneath the catches, these latter may be raised by a partial rotation of the shafts; this is effected by any of the lever arrangements previously described, actuated in the first instance by a hand lever. When it is required to let the cage down the shaft the hand lever is moved, raising the catches so far back that they do not project so as to catch the cage, and the latter is thus free to descend. During the ascent the cage itself lifts the catches and clears the passage, and only once, at the commencement, is it necessary for the banksman to lay hold of the actuating lever, whatever be the number of decks in the cage; this arrangement also offers some protection against the liability of the cage falling down the shaft in case of breakage of the rope by overwinding when the safety hook fails.

Where the rapidity of winding is great it is advisable to have some means of reducing the shock on landing the cage both at the bottom of the shaft and at the pit bank. At some collieries indiarubber packing is placed beneath the bearings, carrying the shafts on which the caps are fitted; in others very stiff springs are placed beneath the timber frame carrying the bearings for the caps. With such arrangements care must be taken that the elastic material has sufficient stiffness, so that the difference in level when the cage is loaded and when unloaded is not great enough to interfere with the easy withdrawal of the corves from the cage.

For the landing at the pit bottom Sterne has brought out a pneu-

matic buffer arrangement, consisting of two cylinders, one of which slides within the other; the larger cylinder contains alternately thick annular rings of indiarubber and thin annular plates of steel, the latter of the full diameter of the cylinder. The upper plate, on which rests the smaller cylinder is a flat disc; when the cage comes to rest upon the landing the upper cylinders are forced down into the larger, compressing the air as well as the indiarubber rings. If the buffers are attached to the bottom of the cage they serve also for the landing at the pit bank in place of the above arrangements.

UNITED STATES FINANCES.—The twentieth annual report of the Comptroller of the Currency has just been issued by the Treasury Department at Washington. The number of national banks organised during the year ended Nov. 1, 1882, was 171, with an aggregate authorised capital of \$15,767,300. Circulating notes have been issued to these associations amounting to \$6,500,680. This is the largest number of banks organised in any year since 1872. During the year 19 banks, with an aggregate capital of \$1,855,000, and circulation of \$1,440,800, have voluntarily discontinued business. National banks are organised in every State of the Union and in every organised Territory. The total number in operation on Oct. 3 was 2269, the largest number that has ever been in operation at any one time. The total currency of the country on Nov. 1 was \$1,488,838,554. No change has been made in the amount of legal tender notes outstanding. The report, which is obtainable in this country through Messrs. Trübner and Co., of Ludgate Hill, contains an abundance of valuable and interesting information, and the synopsis of decisions of the Supreme and Circuit Courts of the United States, and of State Courts of last resort upon national bank questions given by way of appendix will prove of great commercial utility.

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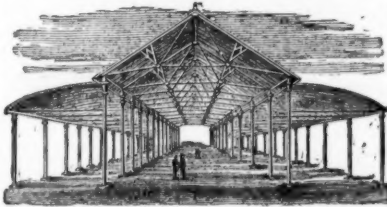
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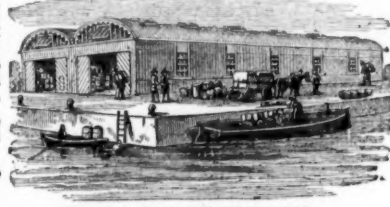
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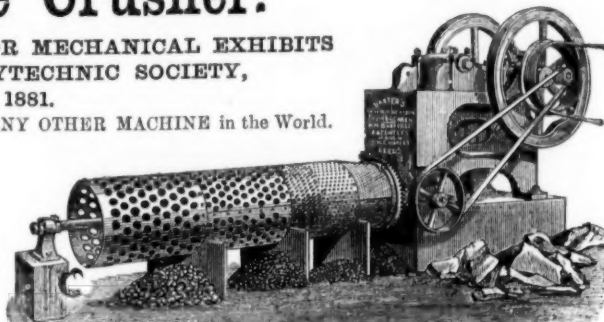
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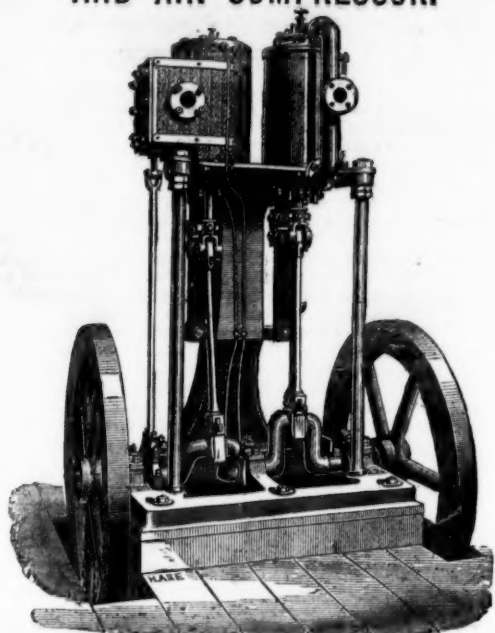
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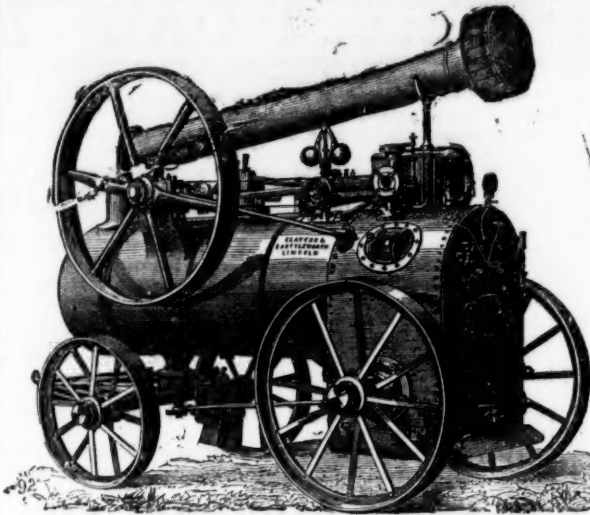
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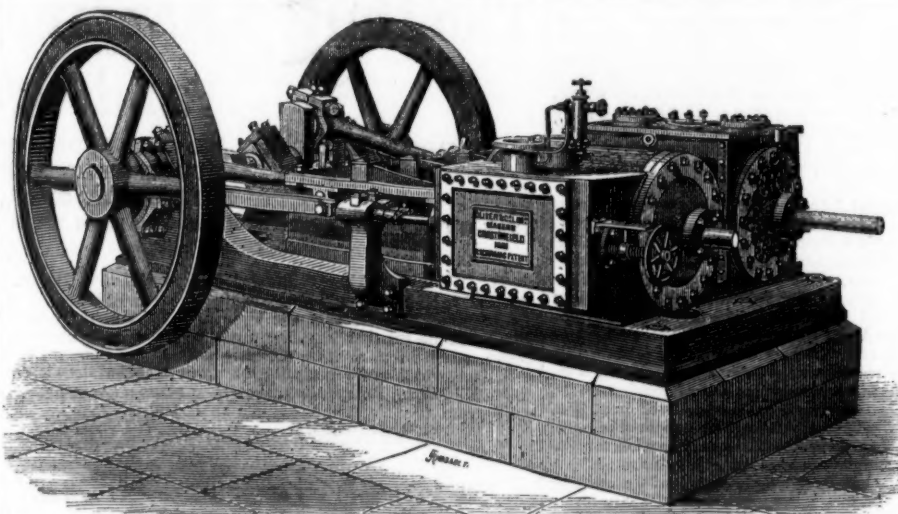
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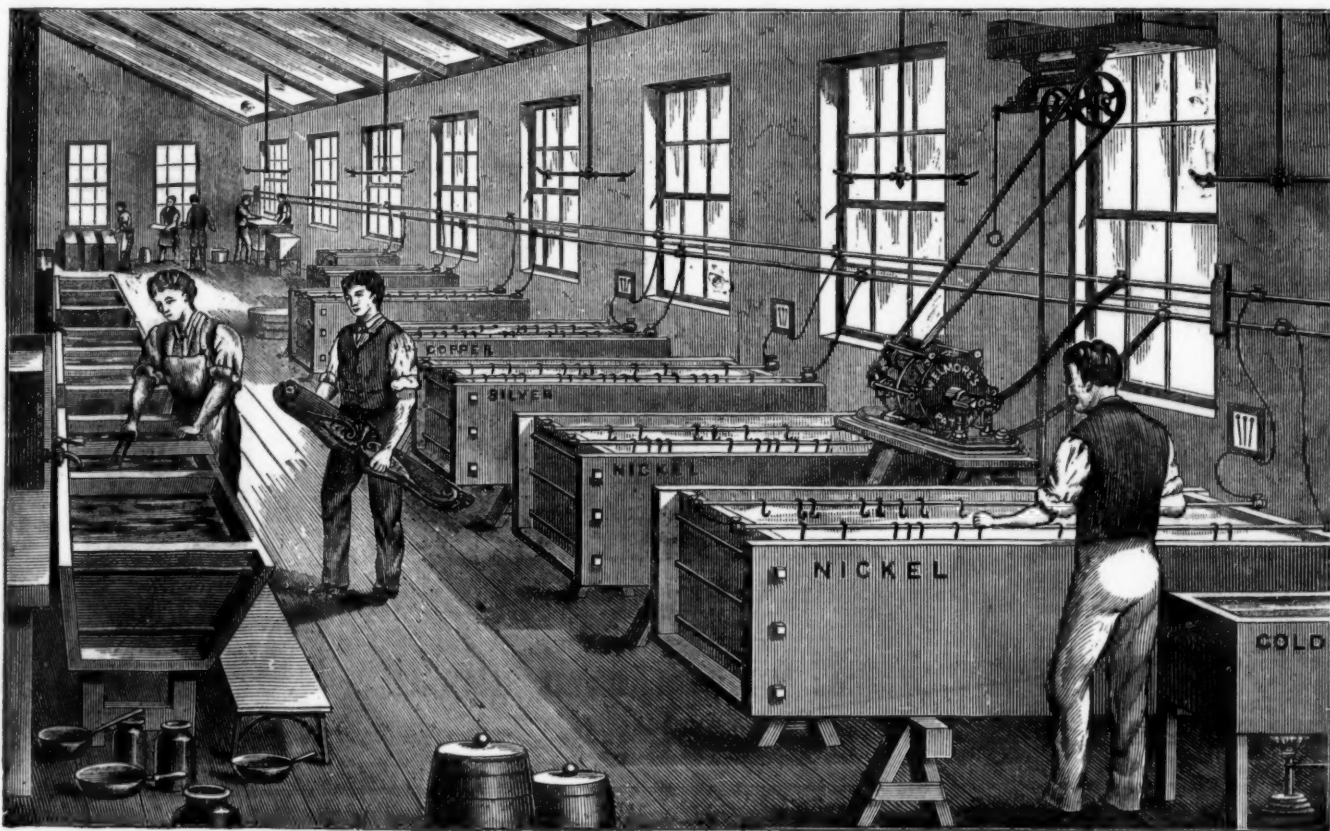
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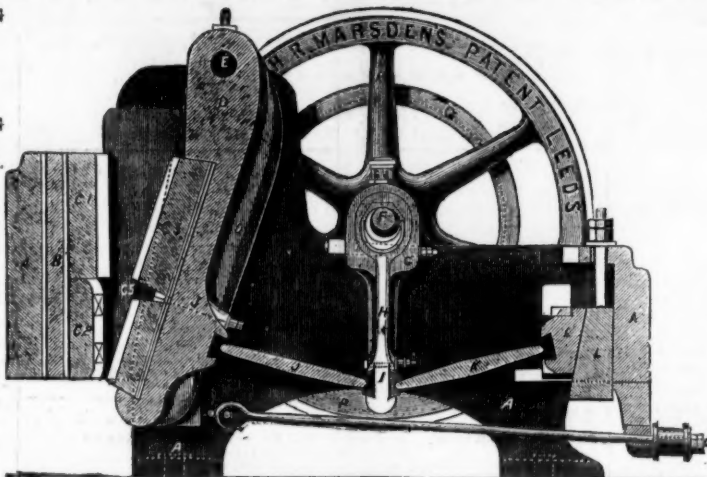
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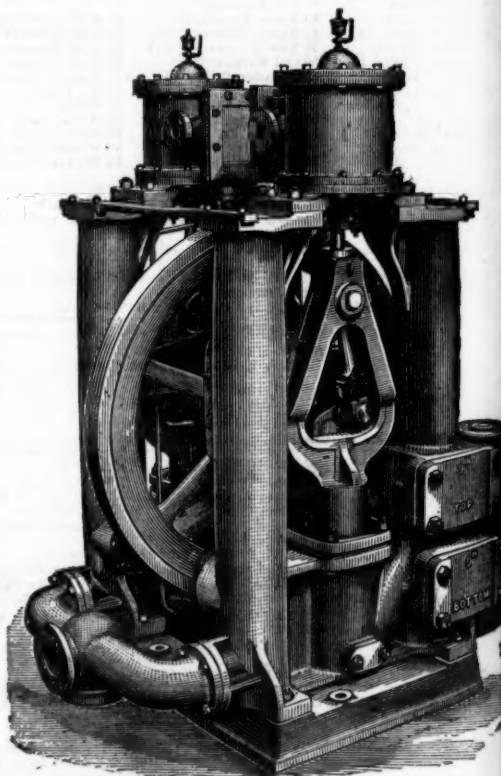
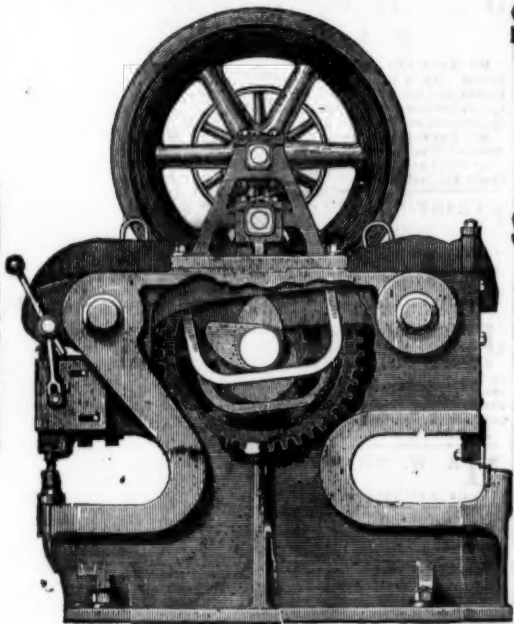
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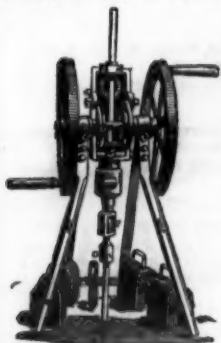
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